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Europe and Central Eurasia

Volume III

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Marcia K. McNutt, Director

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Foreword

This edition of the U.S. Geological Survey (USGS) Minerals Yearbook discusses the performance of the worldwide minerals and materials industries during 2007 and provides background information to assist in interpreting that performance. Content of the individual Minerals Yearbook volumes follows:

- Volume I, Metals and Minerals, contains chapters about virtually all metallic and industrial mineral commodities important to the U.S. economy. Chapters on survey methods, summary statistics for domestic nonfuel minerals, and trends in mining and quarrying in the metals and industrial mineral industries in the United States are also included.
- Volume II, Area Reports: Domestic, contains a chapter on the mineral industry of each of the 50 States and Puerto Rico and the Administered Islands. This volume also has chapters on survey methods and summary statistics of domestic nonfuel minerals.
- Volume III, Area Reports: International, is published as four separate reports. These regional reports contain the latest available minerals data on more than 190 foreign countries and discuss the importance of minerals to the economies of these nations and the United States. Each report begins with an overview of the region's mineral industries during the year. It continues with individual country chapters that examine the mining, refining, processing, and use of minerals in each country of the region and how each country's mineral industry relates to U.S. industry. Most chapters include production tables and industry structure tables, information about Government policies and programs that affect the country's mineral industry, and an outlook section.

The USGS continually strives to improve the value of its publications to users. Constructive comments and suggestions by readers of the Minerals Yearbook are welcomed.

Marcia K. McNutt, Director

Contacts

Information about the U.S. Geological Survey, its programs, staff, and products may be accessed on the Internet at http://www.usgs.gov or by contacting the Earth Science Information Center at 1-888-ASK-USGS. For specific information about this publication, contact the Chief, Global Minerals Analysis Section, National Minerals Information Center (NMIC), at (703) 648-7732, or the NMIC secretary at (703) 648-4961. Additional minerals information may be accessed on the Internet at http://minerals.usgs.gov/minerals.

Acknowledgments

The Country Specialists in the National Minerals Information Center, U.S. Geological Survey, in preparing the International Review regional books of volume III of the Minerals Yearbook, extensively use statistics and data on mineral production, consumption, and trade provided by various foreign Government minerals and statistical agencies through various official publications. The cooperation and assistance of these organizations are gratefully acknowledged. Statistical and informational material was also obtained from reports of the U.S. Department of State, United Nations publications, and the domestic and foreign technical and trade press. Of particular assistance were reports submitted by the Resource Reporting Officers and other officers of the Department of State in U.S. Embassies worldwide. Their contributions are sincerely appreciated. Internal statistical support was provided by the staff of the Data Collection and Coordination Section of the National Minerals Information Center.

The regimes of some countries reviewed in this volume may not be recognized by the U.S. Government. The information contained herein is technical and statistical in nature and is not to be construed as conflicting with or being contradictory of U.S. foreign policy.

John H. DeYoung, Jr.
Director, National Minerals Information Center

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THE MINERAL INDUSTRIES OF EUROPE AND CENTRAL EURASIA

By Richard M. Levine, Mark Brininstool, Steven T. Anderson, Harold R. Newman, Alberto Alexander Perez, Glenn J. Wallace, and David R. Wilburn

The area of Europe and Central Eurasia treated in this volume encompasses territory that extends from the Atlantic coast of Europe to the Pacific coast of the Russian Federation and includes the British Isles and Iceland. Greenland, which is located in the northwestern Atlantic Ocean, and the Sakhalin and the Kurile Islands, which are located off the Sea of Japan in the Pacific Ocean and which are political extensions of Denmark and the Russian Federation, respectively, are also treated in this volume.

Economic integration in Western Europe evolved into the formation of the European Union (EU), which is a supranational entity that at yearend 2007 comprised Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom. The European Free Trade Association (EFTA), which comprised Iceland, Liechtenstein, Norway, and Switzerland, was an alternative entity to the EU in Western Europe.

The admission of new member countries continued to be one of the significant political programs of the EU. To gain membership, applying countries must fulfill political and economic requirements, such as achieve stability of institutions that guarantee to uphold democracy, the rule of law, human rights, and respect for and protection of minorities; have a functioning market economy and the capacity to cope with competitive pressure and market forces within the EU; and be able to take on the obligations of EU membership, including adherence to the aims of political, economic, and monetary union.

In 2007, Bulgaria and Romania were granted EU membership and Slovenia adopted the euro (€) as its unit of currency. Croatia and Turkey continued with EU accession negotiations (no date given for expected accession), Macedonia had been a candidate country since December 2005; negotiations also continued with other countries in the Balkans that were working toward candidate status and were in the preliminary stages of negotiation. The EU also promoted democratic stability and economic development in such Commonwealth of Independent States (CIS) countries as Ukraine through its European Neighborhood Policy (ENP) and in Russia through a strategic partnership (European Commission, 2007a; 2007c, p. 2-8).

The addition of Bulgaria and Romania to the EU in 2007 increased its population by more than 29 million to about 500 million. The population of the EU exceeded that of the United States by about 60% in 2007, and the combined total gross domestic product (GDP) of its member countries (based on purchasing power parity) was approximately equal to that of the United States (tables 1, 2).

In the former centrally planned economy areas, a number of countries of Central Europe (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Hungary, Macedonia, Montenegro, Poland, Romania, Serbia, Slovakia, and Slovenia) and the Baltic countries (Estonia, Latvia, and Lithuania)—had completed the transition to open political systems with market-based economies. The transition among the countries of the CIS (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan) was less complete; some of these countries had taken significant steps towards the establishment of open political systems and market-based economies, but others had made little progress.

The CIS was founded in 1991 by several Republics of the former Soviet Union (FSU) and later was extended to include all the former Soviet Republics except the Baltic states of Estonia, Latvia, and Lithuania. The CIS was established to provide a common economic space for the countries in the region. The CIS does not have supranational powers and all member countries have equal standing under international law. Although the member countries are pledged to economic integration, few actual measures had been taken to make the CIS a functioning integrated economic bloc similar to the EU.

In September 1993, the Governments of the CIS states signed an agreement on the creation of an economic union that would form a common economic space based on the free movement of goods, services, labor, and capital. The economic union would work to coordinate monetary, tax, price, customs, and external economic policy, develop methods of regulating economic activity, and create favorable conditions for the development of direct production relations. Integration of the countries of the CIS into the economic union was executed through its coordinating institutions (charter bodies, executive bodies, and the bodies of branch cooperation of the CIS). In 1997, the Executive Committee of the CIS, with the participation of leading scientists and specialists, prepared a mining charter and an agreement on cooperation for the study, exploration, and use of mineral resources of the CIS states. The goal was to establish international cooperation in the use of the economic and technical resources of the CIS states and to reestablish ties among the mineral industries of the CIS states that had been broken with the dissolution of the Soviet Union. The agreement was signed on March 27, 1997, by Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, and Ukraine. On the basis of this agreement, an Inter-Governmental Council was formed to fulfill the mission of the agreement.

An important step taken by the Inter-Governmental Council was an agreement signed in Minsk, Belarus, on May 30, 2001, to settle disputes regarding mineral development in border areas, to implement environmental measures to protect the population of the neighboring states when developing mineral resources, and to specify conditions for cooperation between neighboring CIS states in mineral development. One of the basic documents regulating these matters was the Model Law Code regarding the Earth's resources and their use signed by the Inter-Parliamentary Assembly of the CIS countries in 2002; the Model Law Code deals with a wide range of issues regarding minerals and mineral development. By 2006, the Inter-Governmental Council was coordinating more than 10 joint programs and projects relating to scientific and technical cooperation, harmonizing laws about the use of resources, and engaging in information exchanges.

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- Croatia—Statistical Information and Documentation Division;
- Czech Republic—Czech Geological Survey, Ministry of Industry and Trade;
- Denmark—Danmark og Gronlands Geologisk Undersogelse;
- Estonia—Geological Survey of Estonia;
- Finland—Statistics Finland;
- France—Bureau de Recherches Géologiques et Minières (BRGM);
- Germany—Bundesanstalt für Geowissenschaften und Rohstoffe;
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General Economic Conditions

From 2003 though the first half of 2008, the world mineral industry experienced one of the most significant upsurges in demand and prices in history. This prolonged period of growing demand and rising prices was largely the result of growing demand, primarily in China and also in other developing countries. Owing to the increasing tight supply of many minerals, production was generally taking place at or near capacity, which meant that the global market could become unsettled by even small supply shortages from major producing countries. The world economic downturn that began in the second half of 2008 changed the conditions of the mineral industry and was expected to lead to a period of reduced production in the short-to-medium term and could have a significant negative impact on the industries of Europe and Central Eurasia (Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 19; World Bank, The, 2008, p. 40, 55, 69).

Because of the very different paths of development taken by the countries of Western Europe (now the EU and the EFTA) compared with that of the countries of Central Eurasia and other centrally planned economy countries of the region after World War II, an economic asymmetry between the two areas emerged that was particularly apparent in the mineral sector. This asymmetry framed the initial commercial relationship in the minerals sphere between the two areas following the dissolution of the Soviet Union, and it still persisted, though to a lesser degree, in 2007. The EU continued to import raw materials from, sell equipment and technology to, and invest in mineral development projects in the as-yet unaffiliated countries of the Balkans and the CIS. This asymmetry was diminishing, particularly as Russian mineral enterprises were attempting to internationalize their holdings. Some of Russia's leading companies, including ALROSA Company Ltd., MMC Norilsk Nickel, and United Company RUSAL (UC RUSAL), were buying major foreign assets.

The countries of the EU and the CIS were substantial participants in the world mineral economy and occupied important roles as suppliers and consumers of all major mineral commodities. In 2007, the EU continued to be a major world processing and consuming region, and its predominant role in the world mineral industry continued to be one of processing and consuming rather than mining. For such industrial minerals as bentonite, gypsum, kaolin, perlite, strontium minerals, and rock salt and also for some metal refinery products, the EU produced more than 20% of global output. Production of some metal ores in the EU exceeded 5% of global production; for example, silver (Poland), chromite (Finland), and zinc (Ireland). The EU was practically self-sufficient in the production of construction materials and remained among the world's leading producers of potash. Significant petroleum and natural gas resources had been developed in the North Sea, and the EU also has significant coal reserves (Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 22).

The extraction of nonfuel minerals accounted for less than 1% of the GDP in the EU, and the highest proportion was in Poland where the share of nonfuel mineral resources still accounted for less than 1% of the country's GDP. More than 16,500 companies located mostly in France, Germany, and Spain were involved in the mining sector in the EU and provided 250,000 jobs in 2004 (the latest year for which data were available). The extractive sector, which included the extraction of energy resources, had an annual turnover of about $181 billion,[1] which did not include value-added production from these raw materials (Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 22).

The EU was mostly dependent on imported mineral raw materials for metals, industrial minerals, and fuel minerals. The import dependence for many metal ores was 100% [antimony, cobalt, ilmenite, molybdenum, niobium, platinum-group metals (PGM), rare-earth metals, rutile, tantalum, and vanadium] and the EU was between 70% and 90% import dependent for most other metallic ores. The EU's dependence on imports of metallic mineral raw materials (such as concentrates, ores, and scrap) and obtaining sources of energy for its metal refining and processing industries was a key concern for the EU's mineral industry. The dramatic rise in the prices of mineral commodities in 2007 was a cause of concern for the industrial sectors in the EU, which were not able to pass on increasing raw materials prices to their customers; the price increases also affected industrial planning, as European countries were experiencing increased competition in the procurement of raw materials from countries in the developing world (Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 19, 22; European Commission, 2008b).

As a major world mineral processing and consuming area, the EU remained a significant determinant of world demand for nearly all mineral commodities. Its mineral processing and manufacturing industries accounted for a significant share of the world production of semimanufactured and fabricated ferrous and nonferrous metals. Germany remained the EU's dominant smelter and refiner of most metals. With a high per capita income and standard of living, the EU was one of the world's major consumers of mineral fuels and of mineral products in consumer goods.

In 2007, the mineral industries in Western Europe generally maintained a stable or somewhat reduced level of output. A decrease in output in many mining and processing sectors was expected in the next decade as reserves are depleted and processing facilities and plants age and are neither renovated nor replaced. Despite the diminution of Western Europe's importance as a mining region, Western Europe was an important world financial center and the headquarters of such major global mining and mineral processing companies as United Kingdom-based companies Anglo American plc, BHP Billiton plc, and Rio Tinto plc.

In 2007, major mineral producing countries in Africa, Asia, Central Eurasia, and Latin America remained major mineral supply sources for the EU. Natural gas and petroleum imports from Russia were particularly important. In 2007, the EU signed new trade agreements with Russia and Ukraine that raised the quotas on EU imports of steel products. The quota on EU imports of steel products from Kazakhstan remained at the same level as in 2006. The EU and Russia also agreed to establish an early warning system for disruptions of oil and gas supplies from Russia to the EU. At the end of 2007, details of the early warning system had not been finalized (European Commission, 2006; 2007b, d; 2008a, p. 4, 16).

Central Eurasia remained a major world supplier of mined and processed minerals. Its consumption of these commodities, although at a low level compared with that of the EU, was increasing. Increased domestic mineral consumption in Central Eurasia could result in the Central Eurasian countries reducing mineral exports to world markets. The unaffiliated countries of the Balkans played a much lesser role in both the supply and the consumption of most mineral commodities.

In the CIS, Kazakhstan, Russia, and Ukraine were the main mineral producing countries, although many other CIS countries also were important producers and processors of minerals. Russia, which occupied about 77% of the territory of the CIS, was by far the largest country in the CIS in terms of both population and territory and had the leading mineral producing sector. In 2007, Russia ranked among the leading world producers or was a significant producer of such mineral commodities as aluminum, arsenic, asbestos, bauxite, boron, cadmium, cement, coal, cobalt, copper, diamond, fluorspar, gold, iron ore, lime, lithium, magnesium compounds and metal, mica (scrap sheet and flake), natural gas, nickel, nitrogen, oil, oil shale, palladium, peat, phosphate rock, pig iron, platinum, potash, rhenium, silicon, sulfur, steel, tin, titanium sponge, tungsten, uranium, and vanadium.

Kazakhstan was a significant producer of such mineral products as arsenic, barite, beryllium metal, bismuth, cadmium, chromite, copper, ferroalloys, lead, oil, rhenium, titanium sponge, uranium, and zinc. Ukraine was a significant producer of such mineral products as ferroalloys, iron ore, manganese ore, pig iron, steel, and titanium raw materials and sponge. Other CIS countries were significant world or regional producers of one or more mineral commodities, including Armenia (molybdenum), Azerbaijan (oil), Belarus (potash), Kyrgyzstan (antimony metal, gold, and mercury ore and metal), Tajikistan (aluminum and antimony ore), Turkmenistan (natural gas), and Uzbekistan (gold and uranium), and all the CIS countries produced a range of other mineral commodities.

The three main mineral producing countries in the CIS (Kazakhstan, Russia, and Ukraine) experienced varying rates of economic growth in 2007. Aggregate growth in Russia was still strong in 2007 as growth received a boost from increases in fuel and nonfuel mineral prices. Analyses from OJSC Alfa-Bank, the International Monetary Fund (IMF), and The World Bank have estimated that in 2007, the oil and gas sector accounted for about 20% of Russia's GDP, 64% of export revenues, and 30% of all foreign direct investment (FDI) in the country. The metallurgical sector accounted for about 5% of the GDP, 18% of industrial production, and 15% of exports. In 2006, about 1 million workers comprising 1.5% of the labor force were engaged in mining. Russia, however, ranked among the lower 20% of mineral extracting countries in its per capita consumption of metals. Russia was extracting its fuel and nonfuel mineral reserves at a high rate, which was expected to lead to the depletion of the majority of these current reserves before the year 2020, if not much sooner (U.S. Energy Information Administration, 2008b).

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[1] Where necessary, values have been converted from European Union euros (€) to U.S. dollars (US$) at the rate of €0.73=US$1.00.

From 2000 to 2007, Ukraine's economic growth had averaged more than 7% per year. In 2007, Ukraine's GDP grew by 7.6%. Ukraine's dramatic growth since 2000 had been fueled in part by improved terms of trade created by rising metal prices. The steel industry was a major component of Ukraine's economy, accounting for between 5% and 6% of the GDP and 34% of export revenues. The steel industry employed about 420,000 people, which constituted about 10% of industrial employment and about 2% of total employment. Steel made up nearly 40% of the value of Ukraine's exports. Ukraine imported almost 80% of its oil and 77% of its natural gas. Russia was Ukraine's main supplier of oil and natural gas and Russian firms owned and (or) operated the majority of Ukraine's refining capacity.

In 2007, prices for long and flat-rolled steel products rose sharply, which caused a reorientation of steel exports from Ukraine as well as other countries, as countries in the Middle East (Jordan, Iran, Saudi Arabia, and Syria) and Pakistan significantly increased steel imports. Ukraine's natural gas imports came from Kazakhstan, Russia, Turkmenistan, and Uzbekistan and were brokered through the intermediary company RosUkrEnergo, which delivered the gas through a pipeline system owned and controlled by Russia's state-owned company OAO (Open Joint Stock Company) Gazprom. A large amount of natural gas and oil destined for the EU and southeastern Europe was transported through Ukraine. About 46% of the EU's gas imports and 23% of the EU's oil imports were transported through Ukraine.

Ukraine's trunk gas transport system was state owned and was the main transit route for Russian gas exports to Europe. Tensions between Ukraine and Russia, ostensibly concerning the price that Ukraine would pay for Russian gas, led to Russia's decision to cut off gas supplies for 3 days in January 2006. Ukraine's energy price dispute with Russia concerning natural gas became a major political dispute. This crisis created fears that Russian exports to Western Europe could be affected, as Ukraine was capable of diverting Russian gas destined for Europe [through Ukrainian pipelines] for its own needs.

On October 2, 2007, Russia's Gazprom announced that it could begin to reduce natural gas supplies to Ukraine within the month if Ukraine did not begin to take action to pay the debt of more than $1.3 billion that it owed Gazprom for previous deliveries. On October 9, an agreement on repayment of the debt was reached. On November 6, a Gazprom press release stated that RosUkrEnergo had fully completed its responsibilities in regard to the agreement on the settlement of debt, which could be interpreted as meaning that the entire amount of debt to Gazprom that was the source of the conflict had been paid.

Kazakhstan is the largest country, in terms of land area, in Central Eurasia after Russia, and has considerable mineral resources. The mineral extraction industry produced about 57% of the value of Kazakhstan's industrial production. Economic recovery and growth, which started in 2000 and continued through 2007, was led mainly by the oil sector. Ferrous and nonferrous metals and grains were the only other significant exports. Oil production was expected to continue to be the major activity driving the economy of Kazakhstan.

Exploration

Based on data provided by the Metals Economics Group (MEG), exploration budgets for Europe and Central Eurasia[2] increased in 2007 to about $1.15 billion from the 2006 estimate of about $784 million (Metals Economics Group, 2007). Exploration activity in this region increased by 47% from the MEG's 2006 estimates. This increase was the result of an increase in reported Russian exploration activity, as well as continued interest in exploration in Kazakhstan, Scandinavia (particularly Finland, Greenland, and Sweden), and Turkey.

Based on exploration site data collected by the USGS, exploration activity in the CIS focused on gold (65% of exploration sites in data collected), nickel (7%), copper (6%), PGM (6%), and silver (4%). European mineral exploration focused on base metals (37%), gold (33%), and uranium (8%). Because of strong metal prices, many former mining areas of Europe were being reevaluated with newer geophysical methods; areas rich in base-metal sulfides were often being reevaluated for their PGM potential.

Legislation

The Government of Kazakhstan has a major role in overseeing foreign investment. Government officials at the highest levels have screened major foreign investment proposals, such as the production-sharing agreements (PSA) for Kashagan (Kazakhstan's massive offshore Caspian Sea oilfield) and the Karachaganak gasfield.

Amendments to Kazakhstan's Law "On Petroleum" dated June 28, 1995, (the Petroleum Law) and to the Law "On the Subsurface and Use of the Subsurface" dated January 27, 1996, (the Subsurface Law) were passed on January 12, 2007. The amendments changed the wording of Kazakhstan's preemptive purchase right for oil assets to stipulate that the Government had to pay "prices not exceeding world-market prices" instead of world market prices (Petroleum Law), and they prohibit the transfer of subsurface-use rights "for two years after the effective date of a Hydrocarbon Contract." This rule does not apply to rights "disposed of during a liquidation, reorganization, or the exercise of a security interest" or when the transferee is KazMunaiGaz (the state oil company).

Kazakhstan's Energy and Natural Resources Minister said that the law preventing foreign investors from selling stakes in Kazakhstan's assets to third parties for 2 years after purchase was in part a response to the $1.9 billion sale of the Karazhanbas oilfield by Canada-based Nations Energy to China's China International Trust and Investment Corp. (CITIC). The Minister also stated that the 2005 sale of PetroKazakhstan Inc. (another Canada-based company with Kazakh oil assets) to China

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[2] Metals Economics Group (MEG) estimates reflect anticipated exploration budgets for projects in mainland Asia, the Commonwealth of Independent States, Europe, and the Middle East. The Europe and Central Eurasia designation used by the U.S. Geological Survey excludes countries located in the Middle East, and estimates for mainland Asia (primarily China and Mongolia) were subtracted from the total to determine the Europe and Central Eurasia estimate. There was insufficient data available in 2007 to allow for the separation of exploration budgets of countries in the Middle East or Asia (other than China) from the MEG data.

National Petroleum Corp. (CNPC) illustrated the need for the new law giving Kazakhstan first right of refusal to buy assets in any proposed transfer of oil assets between foreign companies. KazMunaiGas became a stakeholder in PetroKazakhstan in 2005, and following the passage of this amendment, KazMunaiGas executed an agreement with CITIC to purchase 50% of Karazhanbas.

On September 27, Kazakhstan's Senate also approved a bill further amending the Subsurface Law, which gives the Government a greater ability to revise or annul contracts concerning the exploitation of subsurface resources. The amendments include a statement that in actions by holders of subsurface deposits where a potential exists that could "lead to essential changes of the economic interests of Kazakhstan, creating a threat to national security," the Government has the right to demand changes in the terms of the contract. The bill also states that the Government can annul contracts "if within a period of up to two months after receiving notification the resource user does not provide its written consent to begin talks on changing the terms of a contract or refuses to hold talks; if within a period of up to four months from receipt of the resource user's consent to talks no agreement has been reached; and if in a period of up to six months from the attainment of agreement on restoring Kazakhstan's economic interests the parties do not sign the contract amendments." The President of Kazakhstan signed the amendments into law on October 24.

Amendments to Russia's law on the use of subsurface resources were ratified on January 31, 2007. These amendments set criteria for deposits containing strategic commodities and limit the rights of foreigners to invest in a controlling stake in strategic deposits that have not yet been developed with foreign participation. Strategic deposits would include oilfields with more than 70 million metric tons (Mt) of reserves, natural gasfields with more than 50 billion cubic meters of reserves, copper fields with more than 500,000 metric tons (t) of copper contained in the ore, and gold fields with more than 50 t of gold contained in the ore. All mineral deposits of diamond, pure quartz, and uranium would be considered strategic. These new amendments set criteria for strategic deposits that are much lower for oilfields and gasfields than criteria proposed earlier and would encompass therefore a much larger number of fields—about 30 oilfields and 40 gasfields. For copper, three deposits, including the Udokan deposit, would be listed as strategic, and for gold, the Sukhoy Log deposit would be listed as strategic. A newer version of the law on strategic resources unveiled in 2008 adds beryllium, cobalt, lithium, niobium, PGM, and the yttrium group of rare earths to the list of strategic deposits.

A major function of the EU has been to remove barriers to trade in an attempt to create a single market and to develop a common set of economic policies. New and prospective EU members must adhere to the EU's environmental and commercial standards. In 2007, no common policy was in place regarding the mineral extractive industries, although the European Commission (EC) was working on a paper for release in 2008 that would address the EU's nonenergy raw material needs.

Commodity Overview

This report includes commodity outlook tables. Estimates for production of major mineral commodities for 2009 and beyond have been based upon such factors as announced plans for increased production and new capacity construction and bankable feasibility studies. The outlook tables in this summary chapter show historic and projected production trends; therefore, no indication is made about whether the data are estimated or reported and revisions are not identified. Data on individual mineral commodities in tables in the individual country chapters are labeled to indicate estimates and revisions. The outlook segments of the mineral commodity tables are based on projected trends that could affect current producing facilities and on planned new facilities that operating companies, consortia, or Governments have projected to come online within indicated timeframes. Forward-looking information, which includes estimates of future exploration, mine development and production, cost of capital projects, and timing of the start of operations, are subject to a variety of risks and uncertainties that could cause actual events or results to differ significantly from expected outcomes. Projects listed in the following section are presented as an indication of industry plans and are not a USGS prediction of what will occur.

Because the writing of this report was delayed until late 2009, production data for the first quarter of 2009 were available, as well as a number of official production estimates for that entire year. Therefore, the projections for 2009 represent the market downturn that began near the end of 2008 and had not ended by early 2010. Future economic and industry developments are uncertain, and mineral production in 2011 and beyond is dependent on a number of factors that are difficult to determine. Projections made during financial turmoil are further complicated by different production costs, which enable some enterprises to continue producing despite the economic downturn and even differences in individual countries' policies toward their mineral industries. Some countries have adopted policies to ensure the continuation of production, whereas other countries are either unable or unwilling to do so.

Metals

Bauxite and Alumina and Aluminum.—Western Europe remained the leading producer of aluminum in Europe and Central Eurasia, although Russia was the leading individual producer, with nearly three times as much production as Germany (the second ranked producer). Russia and Kazakhstan accounted for the majority of bauxite production in the region, although production was significantly below that of the world's leading producers.

In March, OAO RUSAL (Russia's leading domestic aluminum producing company) and OAO SUAL (the county's second ranked domestic aluminum producer and leading domestic bauxite producer) merged and joined with the alumina assets of Switzerland-based Glencore International AG to form United Company RUSAL (UC RUSAL). The merged company controlled all bauxite, alumina, and aluminum production in Russia, had operations abroad, and employed 100,000 people worldwide.

Primary aluminum production capacity was increasing in Russia. UC RUSAL planned to increase primary aluminum production to 4.4 Mt in 2008 and to 6.2 Mt in 2013, and most of the expanded output would go to China. (These plans were formulated before the economic crisis that emerged at the end of 2008 and altered production and production plans.) UC RUSAL's acting director for marketing and sales said Asia would account for 50% of UC RUSAL's aluminum sales by 2015, of which 70% totaling more than one-third of UC RUSAL's output would go to China. Also, the acting director predicted that Russia's consumption of aluminum could increase by an average of 11% per year until 2015, which would be a similar rate to the other BRIC countries (Brazil, Russia, and India) (United Company RUSAL, 2008).

UC RUSAL's 300,000-metric-ton-per-year (t/yr)-capacity Khakas aluminum smelter, which was the first aluminum smelter to be built in Russia in the past 20 years, was commissioned in December 2006. The Khakas smelter was projected to reach its installed capacity in October 2007. In 2006, RUSAL had begun work to construct a 750,000-t/yr-capacity greenfield aluminum smelter in Taishet, which was a small town near Irkutsk. Construction was expected to be completed in 2011. UC RUSAL also was carrying out large-scale modernization of the Irkutsk aluminum smelter. The commissioning of new potline no. 5 at Irkutsk would increase total capacity at the smelter by 50% to 450,000 t/yr. The first stage of potline no. 5 was to start production in 2007, and full capacity for potline no. 5 was to be achieved in 2008. Construction of potline no. 6 was planned to begin after the construction of potline no. 5 was completed. When the planned construction of potline no. 6 is completed (projected for 2009), the smelter's production capacity would be 500,000 t/yr.

Included in UC RUSAL's investment project portfolio was the Komi Aluminum project, which was initiated by SUAL. The project entailed the development, construction, and operation of a bauxite-alumina complex in the Komi Republic of Russia. Ore for the project would be supplied by the Middle Timan bauxite deposit that was under development. An alumina refinery to be constructed at Sosnogorsk would be supplied with bauxite from the Middle Timan deposit. The design capacity of the complex was 6.5-million-metric-tons-per-year (Mt/yr) of bauxite and 1.4 Mt/yr of alumina. Plans called for bauxite production at Komi to reach 6.5 Mt/yr by 2010. Construction of the alumina plant in Sosnogorsk had not begun, and the functioning of the alumina refinery would depend on its obtaining an uninterrupted supply of bauxite from the Middle Timan project. The completion of the Komi project would considerably reduce the Russian aluminum industry's dependence on foreign countries for bauxite and alumina.

In Kazakhstan, construction of the country's first aluminum smelter was commissioned in December; construction reportedly had proceeded ahead of schedule. The smelter's annual capacity was expected to be 125,000 t in 2008; the smelter was planned to reach its full annual capacity of 250,000 t/yr by 2011.

Copper.—In 2007, Central Eurasia was the region's main producer of copper ore, and the EU was the leading producer of refined copper. Kazakhstan and Russia accounted for the majority of copper ore production, and although Western Europe was only a minor mine producer of copper ore, it produced a significant share of the total world output of primary and secondary refined copper. Central Europe's contribution to copper ore production and refined copper came almost entirely from Poland. Russia remained the leading producer of refined copper in the region, accounting for about 24% of the region's total, followed by Germany (17%) and Poland (13%).

Kombinat Gorniczo Hutniczy Miedzi Polska Miedz S.A. (KGHM) was Poland's only producer of copper ore and primary refined copper. In 2007, KGHM accounted for about 3% of the world's production of copper ore and refined copper. Poland's copper reserves had been projected to be depleted by 2040, but proposed exploration activity and the development of the Glogow Gleboki-Przemyslowy Mine could extend the lifetime of domestic copper mining by an estimated 40 to 50 years. The company also was considering expanding its resource base through investments in foreign countries.

Russia's leading copper producing enterprise was Norilsk Nickel. At Norilsk Nickel's major mining operations on the Taymyr Peninsula in East Siberia, the company continued its trend of mining larger quantities of cuprous ores, which have a higher content of copper relative to nickel than in the nickel-rich ores that were being depleted. Norilsk Nickel also increased production of disseminated ores, which have lower grades of all metals. The nickel-rich ores that were being depleted, however, have the highest copper content of ore types at Norilsk Nickel.

Urals Mining and Metallurgical Company (UMMC), which was Russia's second ranked copper producer and which comprised 47 enterprises in 11 regions, had about a 40% share of the domestic copper cathode market. In 2007, UMMC's Uralelektromed copper refinery acquired exploration and mining licenses for the Stepnoye and the Talovskoye deposits in Altay Kray. (These deposits would also be mined by the Russian lead and zinc mining company Siberian Polymetals.) Mining at Stepnoye was scheduled to commence in 2010; for the first 10 years of operation, the mine would produce from 400,000 to 450,000 t/yr of ore. The Talovsky Mine (at the Talovskoye deposit) was scheduled to come onstream in 2011; the mine would have the capacity to produce 200,000 t/yr of ore. In 2007, UMMC had the capacity to produce 380,000 t/yr of copper cathodes. Plans called for reconstruction of an electrolysis unit that would enable UMMC to increase copper cathode production to 500,000 t/yr.

Russian Copper Company (RCC), which was the country's third ranked copper company, included 20 mining and metalmaking enterprises that operated in Russia in the Chelyabinsk, the Novgorod, the Orenburg, and the Sverdlovsk Oblasts, the Altay Kray, and the Republic of Dagestan, as well as in Kazakhstan. RCC produced about 20% of Russian copper metal output and about 1% of world copper output. RCC combined 11 upstream and downstream enterprises that mined and processed copper ores and produced copper products. Plans called for RCC to increase copper cathode production using its own raw materials to 185,000 t/yr. RCC planned to increase copper cathode output to 290,000 t in 2010. In 2007, RCC planned to add a third electrolytic plant at Kyshtym with a capacity of 100,000 t/yr; the first 50,000 t of capacity would be added in the late spring and the remaining 50,000 t would be available in December.

At the Udokan copper deposit in Chitinskaya Oblast, which is one of the largest copper deposits in the area of the FSU, a reevaluation of reserves was to be completed at the end of 2009. Owing to the size of its reserves, Udokan was being classified as a strategic deposit, which means that foreign companies would not be able to have a controlling interest in the ownership of the deposit.

Kazakhstan's major copper producer was Kazakhmys PLC, which was engaged in mining, beneficiating, smelting, and refining copper products, including copper cathodes and rods. Kazakhmys' copper division was composed of 20 mining entities, including 14 underground mines and 6 open pit mines. The mineral reserves and resources of these mines reportedly were adequate to support projected production for at least 20 years. Kazzinc JSC was the country's leading producer of lead and zinc and the country's second ranked producer of copper. Kazzinc's plans called for construction of a copper smelter and modernization of its lead production facilities at the Ust-Kamenogorsk metallurgical plant.

Gold.—In 2007, Europe and Central Eurasia accounted for about 13% of world gold production, and about 93% of the gold was from Central Eurasia (table 4). Russia accounted for about 52% of the region's total gold production followed by Uzbekistan and Kazakhstan, which accounted for 28% and 7% of regional production, respectively.

In Russia, gold output fell for the fifth year in succession. Gold production increased in regions with predominately lode deposits, which included the Amur, the Irkutsk, the Kamchatka, and the Krasnoyarsk regions, but production fell in areas with predominately placer deposits, which included deposits in the Magadan Oblast (which in the past had been Russia's leading gold producing region) and Khabarovsk Kray. Although in the past, gold production from placer deposits was the leading source of Russian gold production, in 2007, it accounted for only about 40% of output. Reserves at placer deposits were being depleted and production capacity was being transferred to mine hard rock deposits. Depletion of reserves at placer mines also was attributable in part to a lack of resources by the small companies mining these deposits to conduct necessary exploration. Russia's gold production could begin to increase as new deposits, such as the Kupol field in Kamchatka, are commissioned.

Kyrgyzstan had two gold mining enterprises—the Kumtor Gold Co. (a wholly owned subsidiary of Centerra Gold Inc. of Canada) and the Makmal gold mining enterprise. Gold production at Kumtor was one of Kyrgyzstan's major economic activities. In 2007, Kumtor produced 300,862 troy ounces (9.36 t) of gold compared with 303,000 troy ounces (9.42 t) in 2006. Lower gold production was partially offset by higher gold prices. The average sale price in 2007 was $696 per troy ounce compared with $594 per troy ounce in 2006. Plans for 2008 at Kumtor called for mining to be focused primarily in the south section of the central pit, which would target high-grade mineralization. Production from the mine was expected to increase to between 580,000 troy ounces (18 t) and 620,000 troy ounces (19.2 t) of gold. The major increase in output was planned for the second half of 2008 when the high-grade SB Zone of the south section would be exposed and mined. At yearend 2007, Centerra Gold reported that proven reserves at the Kumtor deposit were 1,223,000 troy ounces (38 t) of gold in 9,888 t of ore grading 3.8 grams per metric ton (g/t) and probable reserves were 3,679,000 troy ounces (114.4 t) in 28,546 t of ore.

Uzbekistan's main reserves of gold and uranium occur in the Central Kyzylkum region between the Amu Darya and the Syr Darya Rivers. The ores were mined and processed by the Navoi mining and metallurgical complex. The Navoi complex had more that 20 gold deposits in western Uzbekistan, of which the largest by far was the Muruntau deposit (one of the world's largest gold deposits). Gold from this deposit was mined from an open pit. Navoi's gold production averaged between 57 and 60 t/yr in recent years. Navoi was also a partner in the Zarafshan-Newmont joint venture, which was initially formed by Navoi, Newmont Gold Corp. of the United States, and the Uzbekistan State Committee for Geology and Mineral Resources (Goskomgeologia). The Zarafshan-Newmont joint-venture recycled tailings generated from the Muruntau gold lode. On August 11, 2006, the Government of Uzbekistan launched a criminal investigation against the joint venture and its employees, however, and blocked the export of any gold. In September 2006, Newmont wrote off the value of its stake in the joint venture 2 months after authorities seized gold and other assets based on two tax claims for payments due between 2002 and 2005. In 2007, Newmont reached an agreement whereby it transferred its stake in the Zarafshan-Newmont venture to The Government of Uzbekistan with none of the parties admitting liability regarding any matters in the dispute.

Romania was considering legislation that would effectively ban the use of cyanide in mining. Such a ban would have an effect on the Rosia Montana gold project, which was under development in 2007 and could make Romania a significant regional producer of gold. Future exploration and development activity at this site also could be affected. Gabriel Resources Ltd. of Canada, which was the company that operated the project, estimated that Rosia Montana could produce an average of about 15,000 kilograms per year (kg/yr) of gold during the 16-year estimated mine life (Marinas, 2007; Gabriel Resources Ltd., 2009).

Iron and Steel.—Europe and Central Eurasia produced about 25% of the world's crude steel production and 18% of pig iron and direct-reduced iron production in 2007. The EU produced about 62% of crude steel in the region, but Russia was the leading individual producer with 21% of regional production followed by Germany (14%), Ukraine (13%), and Italy (10%).

In 2007, Russia was the fourth ranked steel producer and the leading steel exporter in the world. Eight steel mills produced almost 90% of the country's crude steel output. Russia exported about 27 Mt of steel products, which was 45% of its total production of steel products, and it imported 6 Mt. In 2007, Russia consumed 38.6 Mt of finished steel products, which was 17% more than in 2006. The increase in domestic consumption was mainly the result of increased demand for steel in the fuel and energy sectors, in the machine-manufacturing sector for the production of equipment for oil-extraction and oil-refining, and the automotive industry. The Ministry of Economy and Industry projected that Russian steel consumption by 2010 would increase by 32% to 51 Mt/yr.

Russia was engaged in the modernization and expansion of its steel sector, which included constructing a number of minimills. The share of electric arc furnace (EAF) steel was projected to increase to about 35% in 2015 from 27% in 2007. Scrap collection in Russia averaged between 30 and 34 Mt/yr, and the country had a scrap reserve of about 1.8 billion metric tons (Gt). Scrap consumption had averaged between 24 and 25 Mt/yr. In 2007, Russia exported about 7.7 Mt of scrap.

In 2007 in Ukraine, production of crude steel decreased slightly compared with that of 2006 to about 42.8 Mt, and production of finished rolled steel increased by 9.5% to about 24.5 Mt. Projections for 2008 called for Ukraine's crude steel output to increase to 46 Mt; pig iron output was projected to increase to 38.3 Mt compared with 35.6 Mt in 2007. To meet these production targets, steelmakers in Ukraine would need an additional 6.1 Mt of iron ore by the end of 2007, and it was evident that supplies of coke and iron ore could become tight in the coming year. The steel industry planned to maintain a level of exports of at least the 2007 level and hoped that exports could increase by as much as 12% to 20%.

The steel industry in Ukraine was dominated by large producers. In 2006 (the latest year for which data were available), of the total volume of steel produced, 51.7% was produced by oxygen converter furnaces, 44.6% in open-hearth furnaces, and 3.7% in EAFs. Switching to EAFs for steel production was a difficult process, in part because the country's supply of steel scrap was quite limited. An increase in scrap availability could be possible if depreciation rates on capital stock were accelerated and if the amount of scrap available from automobiles increased with increased car ownership. Plans called for the introduction of more continuous casting of steel, which composed only 30% of the steel produced.

Ukraine's steel industry was undergoing a major transformation as major mills invested in modernizing production facilities to achieve improved operational and environmental performance. In 2008, the steel industry planned to increase its investment in modernization and construction by 28% compared with that of 2007. In 2007, such investment increased by 57.3% compared with that of 2006. In 2007, steel mills increased the value of output by 32.4% compared with that of 2006, but operating margins slipped slightly because of the higher cost of inputs; production costs were projected to continue to increase significantly and profit margins to continue to decrease. Only about one-half of the steel mills were envisioned to be able to operate profitably as production costs increase, which could result in the tax revenues paid to the Government by the industry decreasing.

Iron Ore.—Europe and Central Eurasia produced 13% of the world's iron ore in 2007. Central Eurasia was the dominant producer of iron ore in the region, accounting for 84% of the region's iron ore production. Russia, Ukraine, Sweden, and Kazakhstan were the region's leading producing countries, accounting for 44%, 31%, 12%, and 10% of production, respectively.

In 2007, Russia's iron ore mining industry was able to achieve a 2.9% growth in output compared with that of 2006 to 105 Mt. The major iron ore producers were the enterprises in the Kursk Magnetic Anomaly and in the Northwest and Ural Mountains regions.

The iron content of Russian crude iron ores averages between 30% and 35% iron before beneficiation, which is of higher grade than ore from China and Ukraine but of lower grade than ore from Australia and Brazil where ores average more than 50% iron. More than 60% of iron ore mined in Russia is beneficiated. Only 12.5% of iron ore produced in Russia has an iron content of more than 60%.

The majority of Russia's iron ore output was consumed domestically, but the country exported iron ore to countries in Asia, Europe, and the Middle East. Although Russia exported iron ore, it also imported iron ore mainly from Kazakhstan for the Magnitogorsk Iron and Steel Works, which purchased about 10 to 11 Mt/yr of iron ore from the Sokolovsko-Sarbayskoe Production Association in Kazakhstan.

Russia's reported iron ore reserves are located in 172 deposits, 53 of which were being mined. The basic iron ore reserves are composed mainly of magnetite and hematite-magnetite ores; the average iron content in the magnetite ores ranges between 31% and 35%, and in the hematite ores, between 40% and 50%. The different ore types require specialized technologies to beneficiate in order to produce a marketable product. Russia's iron ore reserves are about 200 times current production levels.

In 2007, Ukraine's iron ore mines increased output of crude ore by about 4% to 77 Mt. A continuing issue for Ukraine remained the price at which iron ore enterprises were marketing their supplies to the country's metallurgical industry, which involved problems in relations between financial and industrial groups and quality-to-price issues. In response, the metallurgical enterprises were increasing imports and the iron ore enterprises were increasing exports, although this solution did not resolve the iron ore mining enterprises' marketing issues. At yearend, iron ore mining enterprises had a record 2.5 Mt of ore stockpiled in warehouses in Europe where their main consumers were located, and they were looking to China to further expand the export market.

A basic issue that faced Ukraine's iron ore mining sector was the high cost of production, including high energy consumption, coupled with low ore grades and difficult geologic conditions for mining at greater depths. Because of these circumstances, the industry was at a disadvantage in competing on the world markets. About 70% of the country's output was consumed by domestic steelmakers who were mainly oriented towards exporting their output.

Ukraine's iron ore mining sector was able to raise the quality of its products, which were still low by world market standards, and this enabled the sector to maintain its level of exports at about 30% of output despite increasing global competition. Nevertheless, unless further improvements in product quality are achieved, it was projected that Ukraine would be at an increasing disadvantage in marketing its output on world markets. The iron ore industry's attempt to maintain its growth in output by mining large quantities of relatively low-grade ore resulted in the industry causing major environmental problems because of the large volume of waste generated.

Lead and Zinc.—The region of Europe and Central Eurasia made up only a small percentage of world production of mined lead (about 10%) but continued to be an important producer of primary and secondary refined lead. Secondary refined lead was the region's most important contribution to the world lead market in terms of quantity of production. In 2007, about 28% of world production of secondary refined lead and 19% of primary refined lead came from Europe and Central Eurasia, and most of the production took place in Western Europe. Poland was the region's leading producer of mined lead, but the country's output was expected to decrease as deposits continue to be depleted and the lead content in mined copper ores decreases (table 4).

Europe and Central Eurasia produced about 14% of the world's production of mine output of zinc and about 26% of the world's zinc metal output in 2007. Ireland and Kazakhstan were the leading producers of zinc ore output, and Spain and Kazakhstan were the first and second ranked producers of refined zinc, respectively.

Russia reportedly possesses 17% of the world's zinc reserves (about 45 Mt) and has two of the larger zinc deposits in the world (the Kholodninskoe and the Ozyornoe, which are located in the Republic of Buryatia). In the environment of high metals prices in 2007 and the growing global demand for metal, greater interest by investors in exploration of these deposits was expected, which could allow a doubling of zinc concentrate production in Russia within 5 to 7 years.

In Russia, more than 60% of zinc was used for the production of galvanized steel, mainly for the automobile and construction industries. According to forecasts of the commercial director of Russia's leading zinc metal producer, the Chelyabinsk Zinc Plant, based on trends evident in 2006, Russia's construction volumes could increase by more than 50% by 2010, and automobile production could double by 2015. Also, substantial potential existed for zinc consumption to increase in such areas as alloy production and usage in the chemical industry. Even with increasing zinc consumption within the country, Russia would remain a net zinc exporter in the near future as production exceeded consumption by 62,000 t in 2006 (the latest year for which data were available).

UMMC, which was Russia's second ranked copper producer and which had facilities centered in the Ural Mountains region, also produced about 50% of Russia's lead metal and 40% of its zinc metal. Plans called for UMMC to increase production to 110,000 t of zinc in 2009, and eventually to 250,000 t by 2012, which was a 184% increase compared with that of 2006. UMMC produced about 88,000 t of zinc in 2006. Plans also called for UMMC to construct a 140,000- to 150,000-t/yr-capacity zinc smelter in the Sverdlovsk region, which would be capable of processing all UMMC's raw materials. The new smelter was to be commissioned in the summer of 2008. UMMC processed most of its zinc at its zinc refinery in Vladikavkaz, which had a capacity to produce 90,000 t/yr.

Siberian Polymetals, an enterprise subordinate to UMMC, planned to commission the Zarechenskiy Mine in June, which would increase lead-zinc ore production by 100,000 t/yr in the first stage; the mine would reach a design capacity of 300,000 t/yr of ore in 2009. In 2007, the new mine was projected to produce 30,000 t of ore.

Kazzinc JSC was Kazakhstan's leading producer of lead and zinc. The company planned to invest $353 million in developing production in 2007 compared with the $193 million it invested in 2006. Plans called for spending $126 million of the planned investment on the New Metallurgy project, which included modernization of lead production facilities at the Ust-Kamenogorsk metallurgical plant.

ShalkiyaZinc N.V. was another lead and zinc mining company in Kazakhstan. The company's main operations were located in southern Kazakhstan and included the underground Shalkiya Mine in the Kyzylorda region, a processing plant near the town of Kentau 165 kilometers (km) southeast of the Shalkiya Mine, and the Talap greenfield deposit, which is located 30 km southwest of the Shalkiya Mine. One of the company's major assets was the Shalkiya deposit, which reportedly is the largest known zinc deposit in Kazakhstan and accounts for approximately 30% of the country's total zinc reserves. ShalkiyaZinc planned to increase its lead-zinc ore extraction at the Shalkiya deposit to 4 Mt/yr by 2010 from about 3 Mt/yr in 2007. According to the latest audit, ShalkiyaZinc's probable ore in situ reserves total 6.6 Mt of zinc metal and 1.7 Mt of lead metal. The new audit showed that the zinc content of ore that could be profitably mined was far lower than 3%, which was the previous assessment. ShalikyaZinc had a contract with Outokumpu Technology Oy of Finland to construct a new ore processing plant at the deposit.

In 2007, the Almalyk mining and metallurgical complex in Uzbekistan was producing zinc metal at its zinc smelter on a tolling basis. Almalyk, however, had started to develop a lead and zinc mining and beneficiation complex to develop the Uchkulach lead-zinc deposit where Almalyk had a mothballed mine. Almalyk was also planning to develop the Khandiza polymetallic ore deposit. The beneficiation plant at the Uchkulach Mine would be capable of processing 500,000 t/yr of ore and the beneficiation plant at the Khandiza Mine would be able to process 650,000 t/yr. Plans called for the complex to go onstream in 2009.

Nickel.—Production of the region's mine output of nickel was almost entirely the result of Russian mining activity whereas refined nickel production took place mainly in Russia and Western Europe. Russia accounted for about 89% of nickel mine output and 52% of nickel refinery production in the region in 2007.

In 2007, Russia was the world's leading producer of mined and refined nickel. Russia's Norilsk Nickel was the world's leading nickel producing company; it had nickel mining and processing operations on the Taymyr Peninsula in Siberia and on the Kola Peninsula in the northwestern part of the country, as well as in Botswana and Finland. Based on the results of an independent audit conducted in accordance with the standards of the Australasian Joint Ore Reserves Committee (JORC), proven and probable reserves of nickel on the Kola Peninsula and the Taymyr Peninsula exceeded 6 Mt. Norilsk Nickel had ore processing and metallurgical enterprises at both its Kola and Taymyr locations, but the refining of PGM concentrates from Norilsk Nickel was outsourced under a tolling agreement to the

Krasnoyarsk nonferrous metals plant. Norilsk Nickel produced 234,454 t of nickel metal products at its Russian operations compared with 244,000 t in 2006, which was in keeping with the company's production targets. Norilsk Nickel's mining operations on the Taymyr Peninsula consisted of seven mines that extracted mixed sulfide ores with varying contents of cobalt, copper, gold, nickel, PGM, and other ore constituents.

On March 1, Norilsk Nickel Finland became part of Norilsk Nickel as a result of Norilsk Nickel acquiring OM Group Inc.'s nickel business, which included the Harjavalta refinery in Finland. OM Group was a United States-based producer of metal-based specialty chemicals. In November 2006, Norilsk Nickel had agreed to supply practically all its cobalt to OM Group. The Harjavalta plant processed nickel concentrates from Norilsk Nickel's operations and nickel semiproducts from third parties.

On June 28, Norilsk Nickel acquired 85% of the shares of Tati Nickel Co. Proprietary Ltd. of Botswana. The Government of Botswana owned the remaining 15% in Tati Nickel. Tati Nickel included the Phoenix open pit nickel mine and the Selkirk underground nickel mine. In 2007, Tati Nickel produced 15,129 t of nickel in concentrate.

Ore production on the Taymyr Peninsula was projected to increase to 18.5 Mt by 2015, with the production of nickel-rich ore (grading 2.5% nickel, 2.25% copper, and 5 to 100 g/t PGM) and of cuprous ores (grading 0.2% to 2.5% nickel, 1% to 15% copper, and 5 to 50 g/t PGM) reaching levels of 7.5 Mt and 5.5 Mt, respectively, and of disseminated ores (grading 0.2% to 1.5% nickel, 0.3% to 2% copper, and 2 to 10 g/t PGM) of 5.5 Mt. The key projects that would enable Norilsk Nickel to achieve its production target of 7.5 Mt/yr of nickel-rich ore on the Taymyr Peninsula were the development of the Skalisty Mine, which would have a total capacity of 3 Mt/yr, and the mining of lower horizons of the Taymyrsky Mine, which would increase the total output at Taymyrsky to 4 Mt/yr by 2011.

The increase in cuprous ore output on the Taymyr Peninsula to 5.5 Mt was to be achieved by the expansion of mining curprous ores at the Oktyabrsky Mine to 3 Mt/yr, which would offset the depletion of nickel-rich ore. An expansion of cuprous ore mining by 2.5 Mt/yr was planned at the Komsomolsky Mine where total output was projected to be 4.3 Mt/yr. Achieving an optimal production of disseminated ore of 5.5 Mt/yr was to be achieved by stripping new mining areas at the Komsomolsky, the Oktyabrsky, and the Zapolyarny Mines.

Production on the Kola Peninsula was projected to remain at about 7.5 Mt/yr, which would be achieved by commissioning the Severny-Gluboky Mine at its design capacity of 6 Mt/yr by 2012. Production from Severny-Gluboky would offset the decommissioning of the Tsentralnaya open pit mine.

The implementation of Norilsk Nickel's mine development plan would enable Norilsk Nickel to maintain stable metal production levels. Increases in base and precious metals production on the Taymyr Peninsula was to be achieved by using newly developed technology to upgrade concentration operations and expand capacity and also by increasing the rate of processing of stored pyrrhotite tailings. On the Kola Peninsula, the modernization of metallurgical operations was primarily aimed at reducing sulfur dioxide emissions.

RCC planned to invest $160 million to build a nickel production complex in Chelyabinsk in the Ural Mountains region; the first stage was to go into operation in 2009. RCC had started constructing a mine and an ore enrichment plant at the Kulikovskaya group of nickel and cobalt deposits. The design capacity of the plant was expected to be 7,000 t/yr of nickel metal.

Platinum-Group Metals.— Within the region of Europe and Central Eurasia, almost all platinum-group metal (PGM) mining took place in Russia, but small amounts of PGM were also mined in Finland, Poland, and Serbia. Russia and the Republic of South African were the world's two leading PGM mine output producers—Russia was the world's leading producer of palladium and South Africa was the world's leading producer of platinum owing to the different ratios of these metals in the ores of each country. For refined PGMs, Germany accounted for almost 40% of the world's refined platinum production and Russia accounted for 45% of the world's refined palladium output and 8% of the world's refined platinum output.

PGMs have important applications in the industrial sector. Palladium and platinum and, to a lesser extent, rhodium are critical components of catalytic converters, which control automobile emissions, and platinum is the critical catalytic element in the Proton Exchange Membrane (PEM) fuel cell under development to power automobiles. PGMs are likely to be in much greater demand as the world's automobile fleet increases in size and is equipped with catalytic converters. As legislation calling for stricter automobile emissions controls is enacted, greater loadings of PGMs in catalytic converters will likely be required. Also, the need for alternative sources of energy to oil could result in the development of a hydrogen-based economy powered by fuel cells that use platinum as a catalyst.

In 2007, Norilsk Nickel's operations in Russia produced more than 95% of the country's PGMs. Norilsk Nickel did not project a near-term increase in PGM production at its Russian operations. Norilsk Nickel also produced PGMs at the Stillwater Mining Co. in Montana and at Tati Nickel in Botswana.

Based on the results of an independent audit conducted in accordance with the standards of the JORC, proven and probable reserves of palladium on the Taymyr Peninsula exceeded 63 million troy ounces (about 2,000 t), and those of platinum, 16 million troy ounces (about 500 t) at a combined grade of 7.54 g/t PGM.

Barrick Gold Corp. of Canada estimated that, at the end of 2006, its Fedorova Tundra deposit in the Murmansk region of Russia contained measured and indicated resources of 1.1 million troy ounces (about 34 t) of palladium and 300,000 troy ounces (about 9 t) of platinum and inferred resources of 1.3 million troy ounces of palladium (about 40 t) and 300,000 troy ounces (about 9 t) of platinum. Barrick later stated that continued exploration might double the size of the resources. Barrick planned to mine the deposit to produce concentrate, which would be processed at Norilsk Nickel's Severonikel plant on the Kola Peninsula. Production was scheduled to commence in 2010, and output was projected to be 150,000 t/yr of concentrate at a grade of 98 g/t PGM.

Industrial Minerals

Diamond.—Russia was the world's leading diamond mining country and the only significant diamond mining country in Europe and Central Eurasia; almost all its output was mined by ALROSA of Russia, which had its main operation in the Sakha (Yakutiya) Republic in East Siberia. ALROSA was one of the world's leading companies in the field of diamond exploration, diamond mining, sales of rough diamond, and diamond processing, and it accounted for 97% of all Russia's diamond production. The company's share in global rough diamond production was 23%.

One of ALROSA's top priorities in 2007 was expanding the company's mineral resources. ALROSA continued to develop cooperation with Angola and, in 2007, signed an agreement with Empresa de Diamantes de Angola (Endiama) (which was Angola's state-owned diamond mining company) on joint prospecting in an area of 3,000 square kilometers in the Cacolo municipality. In expanding the company's activities outside Russia, ALROSA also signed an agreement on cooperation with the Government of Armenia for diamond and jewelry manufacturing, providing for exchanges of information, and coordinating to strengthen the competitive positions of Russian and Armenian diamond manufacturers in the world market.

Phosphate Rock.—Russia was the only significant producer of phosphate raw material in Europe and Central Eurasia and produced 8.5% of the world total. In Russia, the major source of phosphate ore is the apatite reserves in the Khibiny massif and the Kovdor deposit on the Kola Peninsula. The Khibiny apatite-nepheline ores contain about 90% of the country's apatite reserves and have a P_2O_5 content of 12% to 16%. The OAO Apatit complex (a part of FosAGro Holding) that mines the Khibiny massif produced about 8.5 Mt/yr of apatite and nepheline concentrates and employed about 12,500 persons. Beneficiation facilities for apatite-nepheline ore from Khibiny produced two types of apatite concentrate: "standard", which contains not less than 39% P_2O_5, and "super", which contains 40% P_2O_5 and less than 0.02% titanium dioxide. Reserves at Khibiny were reportedly sufficient to sustain 2007 production levels through 2050.

Potash.—Belarus, Germany, and Russia were three of the world's leading potash producers and together accounted for 44% of the world's potash output. Russia produced 19%, Belarus, 14%, and Germany, 10.5%, of the world total.

In Belarus, the Production Amalgamation (PA) Belaruskali was in charge of mining at the Starobin potash deposit, which is one of the largest in the world. The deposit was discovered in 1949 and mining had been taking place there since 1962. The deposit consists of four separately delineated potash beds. The first, second, and third potash beds had been mined but the majority of potash reserves occur in the third bed. Reserves in the second bed were practically depleted, and the remaining reserves in the first bed had been reclassified as uneconomic. Because reserves at mining directorates nos. 1 and 2 were almost depleted, new sectors in areas that surround the deposit would need to be developed to maintain and expand production. Development reportedly had begun at the Krasnoslobodskiy sector to the east of mine no. 2, which reportedly contained 345 Mt of potash salts containing 51.4 Mt K_2O. Future development of other sectors adjacent to existing mines was also planned. The potash ore was primarily sylvinite.

Russia's two major potash producers—OAO Silvinit and OAO Uralkaliy—mined potash containing potassium-magnesium salts from the Verkhnekamsk deposit in the Ural Mountains region and Verkhnekamsk, which is reportedly the second largest potash deposit in the world, The two companies were linked through minority shareholding but operated independently of one another. Uralkaliy was one of the leading five potash producers in the world and produced about 13% of the world's potash fertilizer output. Its main product was potassium chloride. Potash mined at Uralkaliy was used in direct application as fertilizer and also in the production of compound fertilizers. Uralkaliy exported 90% of its output.

Uralkaliy together with Belaruskali (the major potash enterprise in Belarus) formed the Belarusian Potash Co. (BPC) in 2005; this company became the world's leading potash exporter and controlled 34% of the world's potassium fertilizer exports. In 2005, potash production at Uralkaliy increased to 5.417 Mt of potassium chloride, but in 2006, one of the company's three mines was closed because of flooding, which resulted in reduced output. To compensate for the loss of output, Belaruskali began a program to increase production at the remaining two mines and to modernize the beneficiation plant. Plans were underway to develop a third mine at the Ust'Yayvinsskiy sector at the Verkhnekamsk deposit, which was planned to go into operation by 2015. By 2011, Uralkaliy planned to raise output of potassium chloride to 7 Mt, which would necessitate raising ore output to 27 Mt/yr from the current 19 Mt/yr.

Silvinit was Russia's leading potash producing enterprise. The enterprise produced about 10% of the world's output of potassium fertilizers and, in terms of production capacity, was the world's fifth ranked company. In 2006, Silvinit successfully fulfilled its Plus Million program that it had adopted in 2004 to increase the volume of output to 5 Mt/yr of potassium chloride, and the company began a new Plus Million program to raise output to 6 Mt in 2009.

German potash production was dominated by K+S Aktiengesellschaft, which was the leading producer of potash in the EU and the fourth ranked producer of potash in the world. Production was expected to substantially decrease in 2009 but to recover rapidly in 2010. K+S was a minor supplier to China (the world's leading consumer of potash), and production was expected to recover in 2010 owing to a recovery in EU markets and other markets that K+S is more typically involved in.

Mineral Fuels and Related Materials

Coal.—In 2007, Europe and Central Eurasia accounted for 7% of the world's anthracite production, 11% of the world's bituminous coal production, and 61% of the world's lignite production. In Central Eurasia, Russia, Kazakhstan, and Ukraine (in order of output) were the leading coal producers, and within the EU, Germany and Poland were the leading coal producers. A number of other countries throughout the region also mined coal (table 4).

Russia ranked fifth in the world in the total volume of coal mined following China, the United States, India, and Australia. Since 1999, the country had experienced growth in its coal output every year. Almost all growth in coal output was of higher quality coal, which was exported. Domestic coal consumption had remained at about the same level and consumption of coal for energy generation had decreased, in part because of warmer winters in Russia and larger volumes of water in rivers and reservoirs, which increased hydroelectric output. Coal was consumed domestically primarily at coal chemical plants and powerplants. Economic (balansovye) reserves in categories A, B, and C1 (classified according to the reserve classification system that was in use in the Soviet Union) were reportedly 200 Gt, of which brown coal comprised 53% of reserves; bituminous coal, about 44%; and anthracite, 3.5%. Reserves at operating mining enterprises were about 19 Gt, of which metallurgical coal comprised about 4 Gt. As of January 1, 2007, Russia had in operation 240 coal mining enterprises, of which 97 were underground coal mining enterprises and 143 were open pit mining enterprises. The Kuznetsk Basin (Kuzbas) was the country's main producing region and was expected to be so in the future. Reserves in the Kuzbas contained all grades of hard coal and were suitable for use in energy generation and coke production.

Revised projections by the Russian Government called for Russian coal production in a moderate case scenario to increase to 410 Mt by 2015 and 470 Mt by 2020. Earlier projections called for coal production in the moderate scenario to increase to 375 Mt by 2020. Growth in coal production would likely come from the eastern part of the country from the large Kansk Achinsk brown coal basin, the Pechora basin (which has significant reserves of metallurgical coal), and the South Yakutiya basin. Coal production in the current large producing areas in the European part of Russia and the Ural Mountains region was projected to stabilize, but under favorable circumstances, could increase by 30 Mt/yr.

Long-range plans called for Kazakhstan (the CIS's second ranked coal producer) to increase annual coal production to 145.6 Mt by 2020 according to the Coal Industry Department at the Kazakh Energy and Mineral Resources Ministry. Production of metallurgical coal was projected to increase to 24.3 Mt in 2020 from 12.9 Mt in 2006 and production of steam coal, to 121.3 Mt from 83.4 Mt. Achieving the targeted level for 2020 would require an investment of $3.9 billion, of which $2.1 billion would be targeted for metallurgical coal development and $1.8 billion, for steam coal.

Ukraine was the CIS' third ranked coal producing country and was among the world's leading coal mining countries. Ukraine's energy strategy, which was approved by the Government in 2006, called for increasing coal output to 130.3 Mt by 2030.

Ukraine's economic (balansovye) reserves (calculated according to the reserve classification system used during the Soviet period and later by many of its successor states) were reportedly about 8.704 Gt as of January 1, 2005, of which 6.501 Gt was classified as industrial reserves. Metallurgical coal comprised 54% of the total industrial reserves and steam coal reserves composed 46%. With an average annual domestic coal demand of 100 Mt, industrial reserves were considered adequate for 65 years. Production, however, was more than 20% below domestic consumption. Explored reserves in Ukraine were reportedly 117 Gt.

Ukraine's Coal Industry Ministry planned to attract investors to develop deposits in the Dnepr brown coal basin, according to an investment proposal that it posted on its Web site on August 15, 2006. The proposal called for developing two deposits—the Aleksandriiskoye deposit, which has brown coal reserves reported to be 485 Mt, of which 63 Mt was considered suitable for open pit development, and the Verkhnedniprovskoye deposit, which has reported reserves of 236 Mt, for which the explored sections were considered suitable for open pit development. The Ministry calculated that these deposits had the potential to produce 5 to 6 Mt/yr by open pit mining. Mines at the deposits were projected to come onstream in 2 years once development begins.

Germany and Poland produced 17% and 13%, respectively, of coal in Europe and Central Eurasia, but each was expected to decrease production in the future. Coal production in Germany was expected to decrease as the Government phased out the country's hard coal subsidy. Hard coal mining will cease to be economical without subsidies because the current resources lie at great depths underground. Lignite production was expected to remain a mainstay of the German mining industry and electrical power generation sector indefinitely. Coal production in Poland was expected to decrease as mines close because of depleted reserves and difficult mining conditions. Further development of reserves in Poland was not likely as future development projects would face difficult mining conditions, environmental concerns, and lower quality coal in the undeveloped reserves.

Natural Gas.—Russia was the world's leading natural gas producer and exporter and had the world's largest natural gas reserves. Its reserves totaled 47.6 trillion cubic meters, which was about 25% of the world's total natural gas reserves and about 1.6 times larger than the size of the reserves in the country with the second largest reserves, Iran. A large number of countries in the region of Europe and Central Eurasia produced natural gas, but generally not in large amounts. The Netherlands, Norway, and the United Kingdom were large regional producers of natural gas in Europe, and Turkmenistan and Uzbekistan were large regional natural gas producers in the CIS (BP p.l.c., 2008, p. 22).

Almost 90% of Russia's natural gas was produced in the Ndym-Pur-Taz (NPT) region in northern West Siberia (the area's name was derived from the names of three rivers that border it). The NPT region hosts three massive gasfields (the Medvezh'ye, the Urengoy, and the Yamburg), which had been the country's main producers, and had supplied about 70% of the country's gas production. These three fields were in decline, however, as reserves were being depleted. To keep up with the growth in the Russian economy and the country's long-term export commitments to Europe to increase gas output, Russia was expected to have to incur greater costs to develop fields further north and to the east in an even more difficult physical environment than in the NPT region. A main target for future development would be the Yamal Peninsula, where large reserves were discovered in several fields. The newly developed Zapolyarnoye field on the Yamal Penisula was a major contributor to replacing decreasing production from large older fields, where reserves were more than 50% depleted.

Gazprom, which was Russia's major gas producer, projected that between 2008 and 2030, Russia would increase natural gas output; most increases in natural gas output were projected to come from independent gas companies, such as Itera, Northgaz, and Novatek, which although blocked from the export market, had found a niche supplying the domestic market.

In 2005, construction began on the Nord Stream pipeline, which would substantially enhance the flexibility of Gazprom's supply routes to Europe. Gazprom was preparing to develop the Barents Sea Shtokman offshore field; 50% of the gas produced there would be exported as liquefied natural gas (LNG) to Canada and a portion was to serve as a resource base for Russian gas exports to Europe, which would be transported by way of the Nord Stream pipeline.

Russian statistics state that about 25% of associated gas is flared, although the percentage is not exact because of a lack of metering equipment to measure flaring. The Government planned to increase associated natural gas production by increasing the recovery of associated gas.

In 2007, natural gas production in Turkmenistan increased by 9% compared with that of 2006 to 72.3 billion cubic meters. Natural gas production had fallen from a high of about 80 billion cubic meters per year in the 1980s to only 12 billion cubic meters in 1998 owing to the lack of permission to transport its gas to markets through the Russian pipeline network, which was the country's only available route to export gas. The resolution of transport issues between Russia and Turkmenistan enabled Turkmenistan to restore the volume of its natural gas output.

In 2007, Turkmenistan was to export 50 billion cubic meters of gas to Russia. On May 12, 2007, Kazakhstan, Russia, and Turkmenistan signed an agreement to construct a pipeline from Turkmenistan's Caspian shore to Russia through Kazakhstan. It would initially entail the reconstruction of the existing western branch of the Soviet-era Central Asia-Centre (CAC) pipeline that extends along the shore of the Caspian Sea. Along with the reconstructed pipeline, a parallel new pipeline would be laid alongside it to boost overall capacity. A week before the trilateral agreement on the pipeline was signed, the head of Turkmengas (a state-owned company in Turkmenistan) said that the country was interested in diversifying its export routes and cited the possibility of constructing the Trans-Caspian Gas Pipeline (TCGP), which would be an extension of the South Caucasus Pipeline. At a press conference held after the trilateral summit, the President of Turkmenistan said that the TCGP was still on the agenda and that diversification of gas agenda and that diversification of gas distribution could still be examined.

The majority of Turkmenistan's natural gas was produced in the southeastern part of the country from the large Dauletabad-Donmez field. Production was about 40 billion cubic meters per year and resources were initially estimated to be 4.5 trillion cubic meters. Potential increases in natural gas production were expected to come from a group of fields associated with the Caspian Shelf on the right bank of the Amu Darya River and from the Yashlar-South-Iolotan group of fields, which includes the South-Iolotan deposit, which has reserves reported to be more than 400 billion cubic meters of natural gas and 17 Mt of oil, making it one of the largest deposits of natural gas in Central Asia.

In May 2007, the chairman of Turkmengaz reported that the country's energy strategy was to almost double gas production to 120 billion cubic meters per year in 2010 and then to more than triple production to 240 billion cubic meters per year by 2030. To achieve these goals, Turkmenistan would not only have to have adequately appraised its reserves, but would also have to have the ability to attract foreign investment and to construct infrastructure to bring the gas to market.

In 2007, Azerbaijan produced about 10.8 billion cubic meters of natural gas, which was a 78% increase compared with that of 2006. The increase in gas production resulted from the commissioning of production at the Shah Deniz field, increased associated gas production, increased production by the State Oil Company of Azerbaijan (SOCAR), and increased production by the Azerbaijan International Operating Co. (AIOC) at other fields.

Government sources in Azerbaijan predicted that the country would produce as much as 31 billion cubic meters per year of gas by 2011. Almost all Azerbaijan's natural gas production came from offshore fields. Azerbaijan's major natural gas production increases were expected to come from the development of the Shah Deniz offshore natural gas and condensate field, which was estimated by industry analysts to be one of the world's largest natural gas field discoveries of the past 20 years. Shah Deniz, which is located approximately 95 km southeast of Baku, was being developed by the Shah Deniz consortium whose members were BP p.l.c. of the United Kingdom, OAO LUKOIL of Russia, National Iranian Oil Company (NICO), SOCAR, Statoil ASA of Norway, Total S.A. of France, and Turkiye Petrolleri Anonim Ortakligi (TPAO).

In 2006, SOCAR developed a program to increase gas production at Shah Deniz to 8 billion cubic meters in 2008 and to 22 billion cubic meters by 2015. If large-scale development of Shah Deniz were undertaken, production could increase to 35 billion cubic meters per year. With the development of Shah Deniz, Azerbaijan could eventually become a net natural gas exporter, although Azerbaijan remained a net importer during 2007.

Development of the eastern part of the Shah Deniz deposit started in December 2006. By June 2008, four wells were in operation with an average daily output of 19 million cubic meters of gas. The fifth development well was under construction. Gas purchases from Russia were officially suspended in early 2007 when Shah Deniz started producing.

Kazakhstan produced about as much natural gas as it consumed, but the country was poised to become a net exporter in 2008 based on production at the Karachaganak and the Tengiz fields. More than 70% of the country's natural gas was produced by international consortia at the Karachaganak and the Tengiz fields. In 2007, the Oil and Gas Journal revised upwards its estimate of proved natural gas reserves in Kazakhstan to about 2.8 trillion cubic meters, which was roughly equal to Turkmenistan's natural gas reserves. Most of Kazakhstan's natural gas reserves are located in the west of the country, and about 25% of its proven reserves are located in the Karachaganak field. This oil and gas condensate field reportedly has proven natural gas reserves of 1.36 trillion cubic meters. The consortium developing Karachaganak expected to produce about 25.5 billion cubic meters by 2012. Natural gas production in Kazakhstan was almost entirely associated gas (U.S. Energy Information Administration, 2008a).

In Norway, natural gas production commenced in late 2007 from the Ormen Lange field on the Norwegian continental shelf. Completion of this development would make Norway the world's second ranked exporter of natural gas after Russia. When Ormen Lange reaches plateau production in 2010, gas exports from Norway could increase to 120 billion cubic meters, which would be sufficient to meet 20% of the EU's gas requirements. Construction of the $1.16 billion Scandinavian Skanled natural gas pipeline was scheduled to start in October 2009, and the pipeline was expected to begin transmitting gas from Norwegian gasfields in mid-2011. The gas would flow to Sweden and Denmark. Once the Baltic pipeline is completed, gas would be piped from the Denmark terminal to Poland. The Baltic pipeline was scheduled to be completed in 2009.

The Government of the Netherlands planned to spend up to €1.8 billion ($2.3 billion) on new gas-network capacity over the next few years. Domestic natural gas production was declining, and expanding the transport network would enable the country's pipeline manager, Nederlandse Gasunie, to import more natural gas and export any surplus gas. It was expected that the proposed infrastructure would enable new suppliers to enter the market and create access to the LNG market. The LNG supply was expected to surge when Nederlandse Gasunie's Gate import terminal, which would be capable of converting between 8 billion and 12 billion cubic meters per year of LNG back into gas, starts operating in 2010.

Petroleum.—Oil production in the area of Central Eurasia was of major significance to the world's oil supply. In Europe, Denmark-Greenland, Norway, and the United Kingdom were significant regional oil producers. In 2007, Russia was the world's second ranked oil producer and the world's second ranked oil exporting nation. Azerbaijan was engaged in major oil development projects offshore in the Caspian Sea, and Kazakhstan was engaged in major projects both onshore and offshore.

Since 2004, however, the rate of growth in Russian oil production had leveled off to somewhat above 2% annually, which had called into question the long-term growth potential for Russia's oil. Russia's proven reserves of oil at the end of 2007 totaled 79.4 billion barrels. Some Russian officials believe that Russia has a large resource base that could serve to replenish oil reserves if adequate investment were devoted to exploration. Little exploration had taken place in East Siberia and only four or five fields had been discovered there despite the promise of large resources. For the coming decade, Russian oil production was projected to grow at an annual rate of about 1.5% to 2.5% annually owing in part to increased output from oil development on Sakhalin Island. This would be coupled with a slowdown in growth from the major mature oilfields in West Siberia, a number of which had passed peak production. New fields that that were under development would produce almost all Russia's increase in annual oil output in the next 5 years and would probably produce more than one-half of the country's oil in 2020.

In 2007, oil production in Azerbaijan increased by 36% compared with that of 2006 and was owing almost entirely to growth in output at the Azeri-Chirag-Gunashli (ACG) offshore fields, which were being developed by AIOC. AIOC was made up of BP, Chevron Corp., Delta/Hess Corp., Devon Energy Corp., and Exxon Mobil Corp. of the United States, Inpex Corp. and Itochu Corp. of Japan, SOCAR, Statoil, and TPAO, and accounted for more than 70% of the country's total oil exports. In 2007, about 65% of the country's oil output was produced at the ACG fields, where production was projected to continue to increase.

According to industry journals, estimates of Azerbaijan's proven crude oil reserves range between 7 and 13 billion barrels (Gbbl) (about 950 Mt to 1.77 Gt). SOCAR estimated proven oil reserves to be 925 Mt of oil. Azerbaijan had signed more than 20 major agreements to develop oilfields with about 30 companies from 15 countries. From 2008 to 2015, plans called for engaging in 110,000 meters of exploratory drilling. Implementation of SOCAR's program for full-scale development of ACG deposits, along with the possibility of developing new oil and gas condensate deposits in the offshore part of the Azerbaijan sector of Caspian Sea, provided a basis for SOCAR to project oil production of between 66 and 67 Mt/yr in the 2010 to 2015 period.

Kazakhstan reportedly has the largest recoverable crude oil reserves in the Caspian Sea region and accounted for about one-half of the crude oil produced in the region. The country's oil reserves were estimated to be about 40 Gbbl (BP p.l.c., 2008, p. 6). Oil production growth was expected to increase in the next decade primarily from the Tengiz field, where production was expected to double, and from the Kashagan offshore field, which could produce an additional 1 million barrels per day (Mbbl/d) after 2011. The Tengiz field, which had been developed since 1993 by the Tengizchevroil joint venture, was the country's leading oil producer; the field had recoverable crude oil reserves estimated by Chevron to be between 6 and 9 Gbbl (800 Mt and 1.2 Gt). According to Chevron, Tengiz could potentially produce 700,000 barrels per day (bbl/d) by 2010 if its sour gas injection program was fully implemented.

The Kashagan field, which is located off the northern shore of the Caspian Sea near the city of Atyrau, is the largest oilfield outside the Middle East and the fifth largest in the world (in terms of reserves). The field's recoverable reserves were estimated to be 13 Gbbl (1.77 Gt) of oil equivalent, with total reserves-in-place of about 38 Gbbl (5.2 Gt). The field could produce about 300,000 bbl/d by late 2011 with full-scale commercial production expected to commence in 2013. Estimated peak production from Kashagan was estimated to be about 1.3 million barrels per day (Mbbl/d). The Kashagan field had presented particular challenges for its developers as it contains a high proportion of natural gas under very high pressure and also contains large quantities of sulfur. Offshore platforms must also withstand extreme weather fluctuations in the northern Caspian Sea. Additional oil production could originate from the Karachaganak oil and gas condensate field onshore in northern Kazakhstan near the border with Russia's Orenburg field. Karachaganak's oil reserves were estimated to be between 8 and 9 Gbbl (1.1 and 1.2 Gt) of oil and gas condensate.

In the United Kingdom, the Buzzard oilfield in the outer Moray Firth came onstream in January 2007 and immediately became the most prolific oilfield on the United Kingdom continental shelf (UKCS), producing more than twice as much as Elgin, which was the second ranked producing field. The United Kingdom's estimated crude oil reserves of about 4.0 Gbbl were the largest within the EU; the reserves were located mostly offshore on the UKCS. Most of the country's production had come from basins east of Scotland in the central North Sea. The northern North Sea east of the Shetland Islands also contains considerable reserves, and smaller deposits are located in the North Atlantic Ocean. Besides these offshore assets, the country had the Wytch Farm field, which was the largest onshore oilfield in Europe (BP p.l.c., 2008, p. 6).

Norway's petroleum production capacity was about 3 Mbbl/d. Norway was the world's third ranked petroleum exporter after Saudi Arabia and Russia and the seventh ranked natural gas exporter. The Norwegian Petroleum Directorate stated that Norway needed to open up new offshore areas and step up the search in existing areas if it is to remain a key oil exporter. Oil production was declining by about 4% per year since it had peaked in 2000. The Government was also pushing the search for new supplies north in Arctic waters. A total of 31 exploration wells had been spudded in 2007 compared with 26 exploration wells spudded in 2006. The explanation was that there was better access to exploration drilling rigs in 2007. The Norwegian Oil Directorate confirmed a StatoilHydro oil strike 65 km north of Honningsvaag in the Barents Sea. The new field, named Nucula, could contain as much as 300 to 350 million barrels of oil. StatoilHydro announced that it had begun a 2-year drilling program in Arctic waters to determine the potential of Norway's share of one of the world's few remaining unexplored petroleum prospects. StatoilHydro also hoped to cooperate with Russian companies to find petroleum and natural gas further into the Arctic.

Denmark heavily exploited its identified mineral resources, the most valuable of which were the natural gas and petroleum reserves in Denmark's sector of the North Sea. Denmark was a minor producer of natural gas and petroleum compared with Norway and the United Kingdom; however, the country was an important petroleum exporter for certain countries, in particular Sweden. In 2007, Sweden imported about 30% of its oil from Denmark, and Swedish energy security was closely connected to Danish petroleum production. At yearend 2007, Denmark had estimated proven petroleum reserves of 1.11 Gbbl and estimated proven natural gas reserves of 0.11 trillion cubic meters. Production of both natural gas and petroleum was declining as fields were being depleted.

Uranium.—In 2007, Central Eurasia accounted for 34% of the world's uranium production. Kazakhstan made up 17% of world production; Russia, 8%; and Uzbekistan 6%. Uranium mining also took place in several other countries in the region (the Czech Republic, Germany, and Ukraine), but in smaller quantities.

In 2007, Kazakhstan produced 7,827 t of uranium (U_3O_8 content), which was almost 26% more than was produced in 2006. Kazakhstan reportedly hosts 16 Mt of uranium reserves, or about 19% of the world's uranium reserves. Plans called for increasing uranium production by 2009 to about 12,000 t, which would make Kazakhstan the world's leading uranium producer. The commissioning of new mines was proceeding on schedule. Kazakhstan had established three joint ventures with Russia to mine uranium in Kazakhstan, enrich it in Russia, and design and build nuclear powerplants to be sold to other countries.

Russian uranium production had been controlled by Corporation TVEL. It included enterprises that mine and process uranium. TVEL held 17% of the world's nuclear fuel market. In 2006, under an initiative launched by the Russian President, a course was set for increasing nuclear power generation's share to 25% of the country's energy generation by 2030, which would involve building up to 40 new nuclear reactors in Russia.

Russia reportedly has 615,000 t of uranium reserves and prospective resources of 830,000 t. The main deposits are concentrated in the Elkonsky, the Streltsovsky, the Vitimsky, and the Zauralsky regions. Not only Russian deposits, but also deposits of other countries, including Kazakhstan, Ukraine, and Uzbekistan, would be used to meet Russia's demand for uranium.

The Priargunsky Industrial Mining and Chemicals Association, which was subordinate to TVEL, could increase uranium production by more than 50% by 2014-15 to 5,000 t/yr. Russia planned to increase uranium mining through expansion of existing mines and development of new uranium deposits in the Republic of Buryatia and the Chita region, as well as at new joint ventures abroad. The country's total demand for uranium, including uranium for export, was forecasted to increase to 36,000 t/yr by 2020.

Ukraine was reportedly mining only 30% of the uranium it needed for its nuclear power generation at the Vostochny mining complex (VostGOK) based in Zheltye Vody in the Dnipropetrovsk region, which was the country's only uranium mining enterprise. Plans called for increasing uranium oxide production to 900 t in 2008, 1,000 t in 2010, and 2,500 t in 2015. Ukraine was further planning to increase uranium oxide production to 5,900 t by 2025 and 6,400 t by 2030.

Planned production increases were linked with the development of the Novokonstantinovskoye field in the Kirovohrad region. Uranium production at the Novokonstantinovskoye deposit was scheduled to commence in 2008 with production of 100 t of uranium oxide; production was to increase to 500 t by the end of 2009, and full production capacity of 1,500 t would be achieved in 2013.

Russian firms would participate with Ukraine to secure the needs of Ukraine's nuclear power industry in uranium development, processing, and the construction of components for nuclear power. In an effort to attract foreign investment to further develop its uranium resources, Ukraine declassified data on nine uranium deposits.

In Uzbekistan, the Navoi mining and metallurgical complex was the country's only complex for mining and enriching uranium. Uzbekistan's State Geology and Mineral Resources Committee stated that uranium resources mainly are contained in 27 deposits and that total reserves were estimated to be 55,000 t of uranium. Navoi had plans to develop seven uranium deposits to increase uranium production by about 50% by 2012 and mainly had been conducting exploration, development, and uranium trade agreements with companies from Japan and the Republic of Korea.

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TABLE 1
EUROPE AND CENTRAL EURASIA: AREA AND POPULATION (2007)

Region and country	Area[1] (square kilometers)	Estimated population[2] (thousands)
Western Europe:		
Austria	83,870	8,315
Belgium	30,528	10,626
Cyprus	9,250	787
Denmark	43,094	5,460
Finland	338,145	5,289
France	547,030	61,707
Germany	357,021	82,268
Greece	131,940	11,193
Iceland	103,000	311
Ireland	70,280	4,366
Italy	301,230	59,375
Luxembourg	2,586	480
Malta	316	409
Netherlands	41,526	16,381
Norway	323,802	4,709
Portugal	92,391	10,608
Spain	504,782	44,879
Sweden	449,964	9,148
Switzerland	41,290	7,550
United Kingdom	244,820	61,034
Total	3,716,865	404,895
Central Europe:		
Albania	28,748	3,181
Bosnia and Herzegovina	51,209	3,773
Bulgaria	110,910	7,642
Croatia	56,542	4,438
Czech Republic	78,866	10,334
Estonia	45,226	1,342
Hungary	93,030	10,056
Latvia	64,589	2,276
Lithuania	65,300	3,376
Macedonia	25,333	2,037
Montenegro	14,026	600
Poland	312,679	38,061
Romania	237,500	21,547
Serbia	77,474	7,386
Slovakia	48,845	5,396
Slovenia	20,273	2,018
Total	1,330,550	123,463
Central Eurasia:		
Armenia	29,743	3,001
Azerbaijan	86,600	8,571
Belarus	207,600	9,702
Georgia	69,700	4,396
Kazakhstan	2,717,300	15,481
Kyrgyzstan	198,500	5,243
Moldova	33,843	3,792
Russia	17,075,200	141,636
Tajikistan	143,100	6,740
Turkmenistan	488,100	4,963
Ukraine	603,700	46,383
Uzbekistan	447,400	26,868
Total	22,100,786	276,776
Regional total	27,148,201	805,134
World total	148,940,000	6,612,040

[1] Source: U.S. Central Intelligence Agency, The World Factbook 2007

[2] Source: The World Bank 2007, World Development Indicators Database.

TABLE 2
EUROPE AND CENTRAL EURASIA: GROSS DOMESTIC PRODUCT

	Gross domestic product based on purchasing power parity		
Region and country	Gross value (million dollars)	Per capita (dollars)	Real gross domestic product growth rate (percentage)
Western Europe:			
Austria	316,006	38,181	3.1
Belgium	377,215	35,388	2.8
Cyprus	21,400	27,171	4.4
Denmark	203,519	37,265	1.7
Finland	185,853	35,349	4.5
France	2,067,710	33,509	2.2
Germany	2,812,000	34,212	2.5
Greece	324,891	29,146	4.0
Iceland	12,274	39,168	4.9
Ireland	188,936	43,414	6.0
Italy	1,787,000	30,365	1.5
Luxembourg	38,261	79,660	4.5
Malta	9,445	23,026	3.7
Netherlands	647,966	38,995	3.5
Norway	247,956	53,152	3.7
Portugal	230,834	21,779	1.9
Spain	1,352	30,118	3.7
Sweden	335,405	36,578	2.7
Switzerland	301,181	41,265	3.3
United Kingdom	2,167,840	35,634	3.0
Total	12,277,044	XX	XX
Central Europe:			
Albania	19,944	6,298	6.0
Bosnia and Herzegovina	28,166	7,074	6.8
Bulgaria	86,381	11,311	6.2
Croatia	68,907	15,532	5.6
Czech Republic	250,057	24,229	6.6
Estonia	27,633	20,584	6.3
Hungary	191,453	19,020	1.3
Latvia	39,896	17,488	10.3
Lithuania	59,885	17,733	8.9
Macedonia	17,396	8,491	5.0
Montenegro	6,265	NA	9.7
Poland	621,984	16,316	6.6
Romania	245,847	11,401	6.0
Serbia	74,504	10,071	7.1
Slovakia	109,677	20,268	10.4
Slovenia	54,714	27,227	6.1
Total	1,902,709	XX	XX
Central Eurasia:			
Armenia	17,165	4,946	13.8
Azerbaijan	65,523	7,618	23.4
Belarus	105,292	10,949	8.2
Georgia	20,516	4,694	12.4
Kazakhstan	168,378	10,837	8.9
Kyrgyzstan	10,508	2,000	8.2
Moldova	9,811	2,897	4.0
Russia	2,089,610	14,705	8.1
Tajikistan	11,829	1,843	7.8
Turkmenistan	26,822	5,172	11.6
Ukraine	321,874	6,968	7.6
Uzbekistan	64,201	2,390	9.5
Total	2,911,529	XX	XX
Regional total	17,091,282	XX	XX

See footnotes at end of table

TABLE 2—Continued
EUROPE AND CENTRAL EURASIA: GROSS DOMESTIC PRODUCT[1]

Region and country	Gross domestic product based on purchasing power parity: Gross value (million dollars)	Gross domestic product based on purchasing power parity: Per capita (dollars)	Real gross domestic product growth rate (percentage)
World total	65,281,000	XX	XX

NA Not available. XX Not applicable.

Source: International Monetary Fund, World Economic Outlook Database, October, 2008.

TABLE 3

SELECTED EXPLORATION ACTIVITY IN EUROPE AND CENTRAL EURASIA IN 2007

Country	Site	Commodity[1]	Company	Phase[2]
Albania	Devolli	Ni	European Nickel plc.	Exploration.
Do.	Korçe	Ni	do.	Exploration.
Armenia	Hankavan	Au	Global Gold Corp.	Exploration.
Do.	Lichkvaz	Au, Ag, Cu	Tamaya Resources Ltd.	Exploration.
Do.	Tukhmanuk	Au	Global Gold Corp.	Producer.
Azerbaijan	Gedabek	Au, Ag, Cu	Anglo Asian Mining plc.	Feasibility.
Bulgaria	Breznik	Au, Ag	Balkans Gold Ltd.	Exploration.
Do.	Lehovo	Au, Ag	KEFI Minerals plc.	Exploration.
Do.	Ogosta	Au, Ag	Balkans Gold Ltd.	Exploration.
Do.	Peroto	Au	do.	Exploration.
Do.	Rakitovo	Au	Euromax Resources Ltd.	Exploration.
Do.	Trun	Au	do.	Exploration.
Finland	Arctic Platinum	PGM, Au, Ni, Cu	Gold Fields Ltd.	Feasibility.
Do.	Hanhimaa	Au	Dragon Mining NL	Exploration.
Do.	Hannukainen	Iron ore, Cu, Au	Northland Resources Inc.	Exploration.
Do.	Kaavi-Kuopio	Diamond	Sunrise Diamonds plc.	Exploration.
Do.	Kettukuusikko	Au	Taranis Resources Inc.	Exploration.
Do.	Kiimala	Au, Cu	Belvedere Resources Ltd.	Exploration.
Do.	Kittila	Au	Agnico-Eagle Mines Ltd.	Developing.
Do.	Kopsa	Au, Cu	Belvedere Resources Ltd.	Exploration.
Do.	Kuhmo	Ni, Cu, Co, PGM	Vulcan Resources Ltd.	Exploration.
Do.	Kuusilampi	Ni, Zn, Cu, Co	Talvivaara Mining Company Ltd.	Developing.
Do.	Mustavaara	Iron ore, V	Adriana Resources Inc.	Past producer.
Do.	Narkaus	PGM	North American Palladium Ltd.	Exploration.
Do.	Orivesi	Au	Dragon Mining NL	Producer.
Do.	Palotieva	Cu, Au	Northland Resources Inc.	Exploration.
Do.	Sarkiniemi	Ni, Cu, Co	Belvedere Resources Ltd.	Producer.
Do.	Seitapera	Diamond	Kalerian Diamond Resources plc.	Exploration.
Do.	Sivakkalehto	Iron ore	Tertiary Minerals plc.	Exploration.
Georgia	Ipari	Au	EMED Mining Public Ltd.	Exploration.
Do.	Kirtisho	Ag, Au, Zn, Pb	do.	Exploration.
Do.	Zopkhito	Au, Sb	do.	Exploration.
Greece	Skouries	Au, Cu	European Goldfields Ltd.	Feasibility.
Do.	Stratoni	Pb, Zn, Ag	do.	Producer.
Greenland	Aappaluttoq	Ruby	True North Gems Inc.	Exploration.
Do.	Black Angel	Zn, Pb, Ag	Angus and Ross plc.	Exploration.
Do.	Citronen	Zn, Pb	Ironbark Gold Ltd.	Exploration.
Do.	Garnet Lake	Diamond	Hudson Resources Inc.	Exploration.
Do.	Isotoq	Ti, V	MDA Investment Pty. Ltd.	Exploration.
Do.	Malmbjerg	Mo	International Molybdenum plc.	Exploration.
Do.	Nalunaq	Au	Crew Gold Corp.	Producer.
Do.	Seqi	Olivine	do.	Producer.
Hungary	Bataszek	U	Wildhorse Energy Ltd.	Exploration.
Do.	Fuzzeradvany	Au	Carpathian Gold Inc.	Exploration.
Ireland	Clontibret	Au	Conroy Diamonds and Gold plc.	Exploration.
Do.	Galmoy	Zn, Pb, Ag	Lundin Mining Corp.	Producer.
Do.	Limerick	Au	Sipa Resources International NL	Exploration.
Do.	Pallas Green	Zn	Xstrata plc.	Exploration.
Kazakhstan	Akkuduk	Cu, Au, Mo	Celtic Resources Holdings plc.	Exploration.
Do.	Altyntas	Au, Ag	Central Asia Resources Ltd.	Exploration.
Do.	Berezky	Cu, Au	Celtic Resources Holdings plc.	Exploration.
Do.	Dostyk	Au, Ag, Cu, Mo	Cigma Metals Corp.	Exploration.
Do.	Gornostai	Ni, Co	Bekem Metals Inc.	Feasibility.
Do.	Itmuryn	Mo	Celtic Resources Holdings plc.	Exploration.
Do.	Kengir	Au	Central Asia Resources Ltd.	Exploration.
Do.	Koskuduk	Au, Ag	Frontier Mining Ltd.	Exploration.
Do.	Suzdal	Au	Celtic Resources Holdings plc.	Producer.
Do.	Sekisovskoye	Au	Hambledon Mining plc.	Producer.

See footnotes at end of table.

TABLE 3—Continued

SELECTED EXPLORATION ACTIVITY IN EUROPE AND CENTRAL EURASIA IN 2007

Country	Site	Commodity[1]	Company	Phase[2]
Kazakhstan—Continued	Tserkovka	Au	Hambleton Mining plc.	Exploration.
Do.	Uzboy	Au	Alhambra Resources Ltd.	Feasibility.
Do.	Varvarinskoye	Au, Cu	European Minerals Corp.	Developing.
Do.	Zhilandy	Cu, Ag	Celtic Resources Holdings plc.	Exploration.
Kyrgyzstan	Akbal	Au	Kentor Gold Ltd.	Exploration.
Do.	Balakashu	Au	Centrasia Mining Corp.	Exploration.
Do.	Gavasai	Au	Monaro Mining NL	Exploration.
Do.	Kuru-Tegerek	Au, Cu	China Shen Zhou Mining & Resources Inc.	Feasibility.
Do.	M4400, M5600, M6000	Au	Chaarat Gold Holdings Ltd.	Exploration.
Do.	Savoyardy	Au	Kentor Gold Ltd.	Exploration.
Do.	Severny	Cu, Au	Centrasia Mining Corp.	Exploration.
Do.	Sumsar	Au	Monaro Mining NL	Exploration.
Do.	Tolubay	Au	Perseus Mining Ltd.	Exploration.
Macedonia	Ilovitza	Cu, Au, Mo	Euromax Resources Ltd.	Exploration.
Do.	Kazandol	Cu	do.	Exploration.
Norway	Bamble	Ni, Cu	Blackstone Ventures Inc.	Exploration.
Do.	Espedalen	Ni, Cu	do.	Exploration.
Do.	South Norway/Ertelien	Ni, Cu	do.	Exploration.
Portugal	Aljustrel	Zn, Cu, Ag, Pb	EuroZinc Mining Corp.	Producer.
Do.	Alto Sobrido	Au, Ag, Sb	Global Minerals Ltd.	Exploration.
Do.	Braganca	Cu	Wega Mining ASA	Exploration.
Do.	Lagoa Salada	Cu, Zn, Pb, Ag, Au	Redcorp Ventures Ltd.	Exploration.
Do.	Moura	Cu	Northern Lion Gold Corp.	Exploration.
Do.	Neves-Corvo	Cu, Zn, Pb	Lundin Mining Corp.	Producer.
Do.	Penedono	Au	Colt Resources Inc.	Exploration.
Do.	Portel	Cu	Wega Mining ASA	Exploration.
Romania	Certej	Au, Ag	European Goldfields Ltd.	Feasibility.
Do.	Colnic	Au, Cu	Carpathian Gold Inc.	Exploration.
Do.	Oravita	Cu, Mo	do.	Exploration.
Do.	Rovina	Au, Cu	do.	Exploration.
Russia	Anadjakan	Au, Cu	Amur Minerals Corp.	Exploration.
Do.	Arylakh	Ag, Au	Polymetal MNPO	Producer.
Do.	Belaya Goya	Au	Highland Gold Mining Ltd.	Exploration.
Do.	Bugdainskoye	Mo, Au	MMC Norilsk Nickel	Exploration.
Do.	Dukat	Ag, Au, Pb, Zn	Polymetal MNPO	Producer.
Do.	East Chuarvi	PGM, Au	Puma Minerals Corp.	Exploration.
Do.	Elvenei	Au	Zoloto Resources Ltd.	Exploration.
Do.	Federova	Pt, Pd	Barrick Gold Corp.	Exploration.
Do.	Galkinsky	Au, Ag, Zn	Polymetal MNPO	Exploration.
Do.	Garinskoye	Iron ore	Aricom, plc.	Exploration.
Do.	Goltsovoye	Ag	Ovoca Gold plc.	Feasibility.
Do.	Ixinsky	Bauxite	UC RUSAL	Exploration.
Do.	Julietta	Au, Ag	Kinross Gold Corp.	Producer.
Do.	K&S	Iron ore	Aricom, plc.	Feasibility.
Do.	Komi	Al	UC RUSAL	Feasibility.
Do.	Kun Manie	Ni, Cu	Amur Minerals Corp.	Exploration.
Do.	Lobash	Au, Cu	Celtic Resources Holdings plc.	Exploration.
Do.	Mayskoye	Au	Highland Gold Mining Ltd.	Feasibility.
Do.	Monchetundra	Pt, Pd	Eurasian Mining plc.	Exploration.
Do.	Natalka	Au, Ag	Polyus Gold OJSC	Exploration.
Do.	Nezhdaninskoye	Au, Ag	Polyus Gold OJSC	Exploration.
Do.	Novoshirokinskoye	Au	Highland Gold Mining Ltd.	Developing.
Do.	Ozerno-Pyatirechensk	Au	Peter Hambro Mining plc.	Exploration.
Do.	Prognoz	Ag	High River Gold Mines Ltd.	Exploration.
Do.	Pulongskaya	Diamond	Everfor Diamond plc.	Exploration.
Do.	Souker	Ni, Cu	Kola Mining Corp.	Exploration.
Do.	Sukhoi Log	Au, Ag, PGM	Government of Russia	Exploration.
Do.	Svetloye	Au	Fortress Minerals Corp.	Exploration.

See footnotes at end of table.

TABLE 3—Continued

SELECTED EXPLORATION ACTIVITY IN EUROPE AND CENTRAL EURASIA IN 2007

Country	Site	Commodity[1]	Company	Phase[2]
Russia—Continued	Taseevskoye	Au, Ag	Highland Gold Mining Ltd.	Exploration.
Do.	Titimukhta	Au	Polyus Gold OJSC	Exploration.
Do.	Tokhtonysay	Au, Cu	Aurum Mining plc.	Exploration.
Do.	Toupugol-Khanmeishorskiy	Au	Peter Hambro Mining plc.	Exploration..
Do.	Tummanoye	Au	China Metallurgical Group	Exploration.
Do.	Volchetundra	PGM, Au	Eurasia Mining plc.	Exploration.
Do.	West Kytlim	PGM, Au	do.	Exploration.
Do.	Yurievskoe	Au, Ag	Polymetal MNPO	Exploration.
Serbia	Ceovishte	Au, Ag, Cu	Euromax Resources Ltd.	Exploration.
Do.	Plavkovo	Au, Cu	Eurasian Minerals Inc.	Exploration.
Do.	Rudnitza	Cu, Au	Euromax Resources Ltd.	Exploration.
Do.	Stara Planina	Cu, Au	Eurasian Minerals Inc.	Exploration.
Slovakia	Kremnica	Au, Ag	Tournigan Gold Corp.	Exploration.
Do.	Kuriskova	U	do.	Exploration.
Spain	Aquablanca	Ni	Rio Narcea Gold Mines Ltd.	Producer.
Do.	Barruecopardo	W	Ormonde Mining plc.	Exploration.
Do.	El Valle	Au, Cu	Kinbauri Gold Corp.	Exploration.
Do.	Salamanca	Au, W	Ormonde Mining plc.	Exploration.
Sweden	Alum Shale	U	Aura Energy Ltd.	Exploration.
Do.	Ballek	U	Agricola Resources plc.	Exploration.
Do.	Faboliden	Au, Ag	Lappland Goldminers AB	Feasibility.
Do.	Grundtrask	Au	Beowulf Mining plc.	Exploration.
Do.	Guorbavare	U	Continental Precious Minerals Inc.	Exploration.
Do.	Klappibacken	U	Mawson Resources Ltd.	Exploration.
Do.	Lainjaur	Ni, Cu	Blackstone Ventures Inc.	Exploration.
Do.	Långvattnet	U	Mawson Resources Ltd.	Exploration.
Do.	Narke	Ni	Continental Precious Minerals Inc.	Exploration.
Do.	Skommer	Zn	Drake Resources Ltd.	Exploration.
Do.	Vasterbotten	Ni, Cu	Blackstone Ventures Inc.	Exploration.
Do.	Viken	Ni, V, Mo	Continental Precious Minerals Inc.	Exploration.
Tajikistan	Hukas	Ni, Cu	Kryso Resources plc.	Exploration.
Do.	Pakrut	Au	do.	Exploration.
Do.	Zeravshan	Au	Zijin Mining Group Co. Ltd.	Producer.
Ukraine	Saulyak	Au	Eurogold Ltd.	Exploration.
Do.	Yeristovskoe	Iron ore	Ferrexpo plc.	Developing.
United Kingdom	Kearney	Au	Galantas Gold Corp.	Exploration.
Do.	Omagh	Au	do.	Exploration.
Do.	Curraghinalt	Au	Tournigan Gold Corp.	Exploration.
Do.	Falkland Islands	Au	Falkland Gold and Minerals Corp.	Exploration.
Do.	Parys Mountain	Zn, Cu, Pb, Ag, Au	Angesey Mining plc.	Exploration.
Uzbekistan	Amantaytau	Au, Ag	Oxus Gold plc.	Producer.
Do.	Andash	Au, Cu	Aurum Mining plc.	Exploration.

Do., do. Ditto.

[1] Abbreviations used for commodities in this table include the following: Ag, silver; Al, aluminum; Au, gold; Co, cobalt; Cu, copper; Mo, molybdenum; Ni, nickel; Pb, lead; Pd, palladium; PGM, platinum-group metals; Pt, platinum; Sb, antimony; Ti, titanium; U, uranium; V, vanadium; W, tungsten; and Zn, zinc.

[2] Phases of exploration activity have been separated into the following stages: Developing, includes construction and permitting; Exploration, exploration prior to full feasibility study; Feasibility, feasibility study ongoing or completed; Past producer, exploration at an historical producer; Producer, exploration at producing site.

TABLE 4
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007[1, 2]

(Thousand metric tons unless otherwise specified)

	Metals								
	Aluminum				Antimony, mine output, metal content (metric tons)	Chromite, mine output, gross weight	Copper		
			Metal				Mine, metal content	Metal, refined	
Region and (or) country	Alumina	Bauxite	Primary[3]	Secondary				Primary[3]	Secondary
Central Eurasia and Europe:									
Central Eurasia: Commonwealth of Independent States (CIS):									
Armenia	--	--	--	--	--	--	18 [e]	--	--
Azerbaijan	185	--	39	--	--	--	--	--	--
Belarus	--	--	--	--	--	--	--	--	--
Georgia[e]	--	--	--	--	--	--	11 [e]	--	--
Kazakhstan	1,556	4,800 [e]	--	--	--	3,687	405 [e]	406	--
Kyrgyzstan	--	--	--	--	30 [e]	--	--	--	--
Moldova	--	--	--	--	--	--	--	--	--
Russia	3,300	6,777	3,955	--	3,500 [e]	777	820 [e]	650	289
Tajikistan	--	--	419	--	2,000 [e]	--	--	--	--
Turkmenistan	--	--	--	--	--	--	--	--	--
Ukraine	1,700 [e]	--	113	130 [e]	--	--	--	--	--
Uzbekistan	--	--	--	3 [e]	--	--	95 [e]	90	--
Total	6,740	11,600	4,530	133 [e]	5,530 [e]	4,460	1,350 [e]	1,150	289
Share of world total	8.8%	5.8%	11.9%	1.6%	3.1%	21.3%	8.6%	7.4%	11.2%
Europe:									
European Free Trade Association (EFTA):									
Iceland	--	--	399	--	--	--	--	--	--
Norway	--	--	1,304	350 [e]	--	--	--	34	--
Switzerland[e]	--	--	40	190	--	--	--	--	--
Total	--	--	1,740	540 [e]	--	--	--	34	--
Share of world total	--	--	4.6%	6.6%	--	--	--	0.2%	--
European Union (EU):									
Austria	100 [e]	--	--	152 [e]	--	--	--	--	81 [e]
Belgium	--	--	--	(4) [e]	--	--	--	380 [e]	--
Bulgaria	--	--	--	13 [e]	--	--	116 [e]	70	--
Cyprus	--	--	--	--	--	--	--	1	--
Czech Republic	--	--	--	15 [e]	--	--	--	--	--
Denmark-Greenland[e]	--	--	--	30	--	--	--	--	--
Estonia	--	--	--	--	--	--	--	--	--
Finland	--	--	--	44	--	556 [e]	14	110	--
France[e]	500	160	428	222	500	--	--	--	--
Germany	1,000 [e]	--	551	836	--	--	--	302	364
Greece	780 [e]	2,163	166	3 [e]	--	--	--	--	--
Hungary	270 [e]	546	--	50 [e]	--	--	--	--	--

See footnotes at end of table.

TABLE 4—Continued
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007[1, 2]

(Thousand metric tons unless otherwise specified)

	Metals—Continued								
	Aluminum				Antimony, mine output, metal content (metric tons)	Chromite, mine output, gross weight	Copper		
			Metal				Mine, metal content	Metal, refined	
Region and (or) country	Alumina	Bauxite	Primary[3]	Secondary				Primary[3]	Secondary
Central Eurasia and Europe—Continued:									
Europe—Continued:									
European Union (EU)—Continued:									
Ireland[e]	1,800	--	--	--	--	--	--	--	--
Italy	1,100 [e]	--	183	666	--	--	--	29	--
Latvia	--	--	--	--	--	--	--	--	--
Lithuania	--	--	--	--	--	--	--	--	--
Luxembourg	--	--	--	--	--	--	--	--	--
Malta	--	--	--	--	--	--	--	--	--
Netherlands	--	--	301	-- [e]	--	--	--	--	--
Poland	--	--	59	20 [e]	--	--	506	533	--
Portugal	--	--	--	18 [e]	--	--	90	--	--
Romania	23	--	286	12	--	--	2	16	3 [e]
Slovakia	160	--	190	--	--	--	--	--	--
Slovenia	--	--	111	--	--	--	--	--	--
Spain[e]	1,000	--	350	243	--	--	7	255	35
Sweden	--	--	98	32 [e]	--	--	63	214	25 [e]
United Kingdom	--	--	365	194	--	--	--	--	--
Total	6,730	2,870	3,090	2,550	500 [e]	556 [e]	798	1,910	508
Share of world total	8.8%	1.4%	8.1%	31.3%	0.3%	2.6%	5.1%	12.3%	19.7%
Other Europe:									
Albania	--	--	--	--	--	324	-- [e]	--	--
Bosnia and Herzegovina	304	867	147	--	--	--	--	--	--
Croatia	--	--	--	3 [e]	--	--	--	--	--
Macedonia	--	--	--	--	--	--	7 [e]	--	--
Montenegro	240	667	135	--	--	--	--	--	--
Serbia	--	--	--	2	--	--	32 [e]	31	1 [e]
Total	544	1,534	282	4	--	324	39 [e]	31	1 [e]
Share of world total	0.7%	0.8%	0.7%	(5)	--	1.5%	0.3%	0.2%	(5)
Total, Europe and Central Eurasia	14,000	16,000	9,640	3,230	6,030	5,340	2,190	3,120	798
Share of world total	18.3%	8.0%	25.3%	39.6%	3.4%	25.4%	13.9%	20.2%	31.0%
United States	3,890	NA	2,550	--	--	--	1,170	1,270	42
Share of world total	5.1%	NA	6.7%	--	--	--	7.4%	8.2%	1.6%
World total	76,800	200,000	38,100	8,150	180,000	21,000	15,700	15,500	2,580

See footnotes at end of table.

TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007[1, 2]

(Thousand metric tons unless otherwise specified)

	Metals—Continued								
		Iron and steel			Lead				Mercury, mine output, metal content (metric tons)
	Gold, mine output (kilograms)	Iron ore, mine output, metal content	Pig iron and direct-reduced iron	Steel, crude	Mine output, metal content	Metal, refined		Manganese ore, mine output, metal content	
Region and (or) country						Primary[3]	Secondary		
Central Eurasia and Europe:									
Central Eurasia: Commonwealth of Independent States (CIS):									
Armenia	1,400 [e]	--	--	--	--	--	--	--	--
Azerbaijan	--	9 [e]	--	273	--	--	--	--	--
Belarus	--	--	--	2,387	--	--	--	--	--
Georgia[e]	2,000	--	--	--	(4)	--	--	102	--
Kazakhstan	22,000 [e]	13,600 [e]	3,240	4,784	40	118	--	600 [e]	--
Kyrgyzstan	10,636	--	--	--	--	--	--	--	350 [e]
Moldova	--	--	--	995	--	--	--	--	--
Russia	156,912	60,800 [e]	55,523	72,389	50 [e]	94 [e]	--	9 [e]	50 [e]
Tajikistan[e]	3,000	--	--	--	--	--	--	--	30
Turkmenistan	--	--	--	--	--	--	--	--	--
Ukraine	500 [e]	42,800	35,600	42,830	--	--	62	580 [e]	--
Uzbekistan[e]	85,000	--	--	740	--	--	--	--	--
Total	281,000	117,000 [e]	94,400	124,000	90 [e]	212	62	1,290 [e]	430 [e]
Share of world total	11.9%	11.0%	8.6%	9.2%	2.4%	5.5%	1.5%	9.4%	33.1%
Europe:									
European Free Trade Association (EFTA):									
Iceland	--	--	--	--	--	--	--	--	--
Norway	--	1,437	100 [e]	740 [e]	--	--	--	--	--
Switzerland[e]	--	--	--	1,264 [6]	--	--	9	--	--
Total	--	1,440	100 [e]	2,000	--	--	9 [e]	--	--
Share of world total	--	0.1%	(5)	0.1%	--	--	0.2%	--	--
European Union (EU):									
Austria	--	688 [e]	5,907	6,871	--	--	22 [e]	--	--
Belgium	--	--	6,576	10,692	--	--	97 [e]	--	--
Bulgaria	3,964	--	1,069	2,050 [e]	24 [e]	87	--	8 [e]	--
Cyprus	--	--	--	--	--	--	--	--	--
Czech Republic	--	--	5,287	7,059	--	--	26 [e]	--	--
Denmark-Greenland[e]	1,639 [6]	--	--	--	--	--	--	--	--
Estonia	--	--	--	--	--	--	10	--	--
Finland	4,261	--	2,915	4,431	--	--	--	--	45
France[e]	1,500	--	12,425 [6]	19,252 [6]	--	4	88	--	--
Germany	--	44 [e]	31,149	48,550	--	111	244	--	--
Greece	--	575	--	2,550	15 [e]	--	4 [e]	(4) [e]	--
Hungary	--	--	1,394	2,317	--	--	--	5 [e]	--

See footnotes at end of table.

TABLE 4—Continued
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007[1, 2]

(Thousand metric tons unless otherwise specified)

	Metals—Continued								
		Iron and steel			Lead				
						Metal, refined			
Region and (or) country	Gold, mine output (kilograms)	Iron ore, mine output, metal content	Pig iron and direct-reduced iron	Steel, crude	Mine output, metal content	Primary[3]	Secondary	Manganese ore, mine output, metal content	Mercury, mine output, metal content (metric tons)
Central Eurasia and Europe—Continued:									
Europe—Continued:									
European Union (EU)—Continued:									
Ireland[e]	--	--	--	--	54	--	23	--	--
Italy	--	--	11,100 [e]	31,990	1 [e]	48	164	1 [e]	--
Latvia	--	--	--	W	--	--	--	--	--
Lithuania	--	--	--	--	--	--	--	--	--
Luxembourg	--	--	--	2,858	--	--	--	--	--
Malta	--	--	--	--	--	--	--	--	--
Netherlands	--	--	6,400 [e]	7,368	--	--	16 [e]	--	--
Poland	883	--	5,804	10,621	96	23	81	--	--
Portugal	--	10 [e]	100 [e]	1,400 [e]	--	--	3 [e]	--	--
Romania	400 [e]	11	3,923	6,261	1	34	5 [e]	11	--
Slovakia	100 [e]	200 [e]	4,012	4,800	--	--	--	--	--
Slovenia	--	--	--	638	--	--	15	--	--
Spain[e]	3,100	--	4,200	19,000	--	--	110	--	--
Sweden	5,159	16,100 [e]	3,815	5,700	63	38 [e]	40 [e]	--	--
United Kingdom	--	(4) [e]	899 [e]	14,300	(4)	164	144	--	--
Total	21,000	18,700	107,000	209,000	254	508	1,090	24	45
Share of world total	0.9%	1.8%	9.7%	15.5%	6.8%	13.1%	26.5%	0.2%	3.5%
Other Europe:									
Albania	--	--	--	100 [e]	--	--	--	--	--
Bosnia and Herzegovina	--	1,240 [e]	60 [e]	514	--	(4)	--	1 [e]	--
Croatia	--	--	--	75	--	--	--	--	--
Macedonia	450 [e]	--	--	372	32 [e]	--	--	--	--
Montenegro	--	--	--	174	--	--	--	--	--
Serbia	500	--	1,377	1,478	1 [e]	1 [e]	--	--	--
Total	950	1,240 [e]	1,437	2,713	33 [e]	1 [e]	--	1 [e]	--
Share of world total	(5)	0.1%	0.1%	0.2%	0.9%	(5)	--	(5)	--
Total, Europe and Central Eurasia	303,000	139,000	203,000	338,000	378	721	1,160	1,320	475
Share of world total	12.9%	13.1%	18.4%	25.1%	10.1%	18.6%	28.2%	9.5%	36.5%
United States	238,000	33,100	36,600	98,100	434	123	1,180	--	NA
Share of world total	10.1%	3.1%	3.3%	7.3%	11.6%	3.2%	28.6%	--	NA
World total	2,360,000	1,060,000	1,100,000	1,350,000	3,750	3,880	4,130	13,800	1,300

See footnotes at end of table.

TABLE 4—Continued
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007[1, 2]

(Thousand metric tons unless otherwise specified)

	Metals—Continued								
	Nickel		Platinum-group metals, refined, primary and secondary		Silver, mine output, metal content (metric tons)	Tin		Titanium	
Region and (or) country	Mine output, metal content	Refinery products, metal content	Palladium (kilograms)	Platinum (kilograms)		Mine output, metal content (metric tons)	Metal, primary[3] (metric tons)	Ilmenite, TiO_2 content (metric tons)	Metal sponge, metal content (metric tons)
Central Eurasia and Europe:									
Central Eurasia: Commonwealth of Independent States (CIS):									
Armenia	--	--	--	--	4 e	--	--	--	--
Azerbaijan	--	--	--	--	--	--	--	--	--
Belarus	--	--	--	--	--	--	--	--	--
Georgia e	--	--	--	--	1	--	--	--	--
Kazakhstan	--	(4) e	--	--	800 e	NA	--	15,000	25,400
Kyrgyzstan	--	--	--	--	NA	--	--	--	--
Moldova	--	--	--	--	--	--	--	--	--
Russia e	331	270	96,800	27,000	1,200	2,500	3,800	--	34,200
Tajikistan e	--	--	--	--	5	--	--	--	--
Turkmenistan	--	--	--	--	--	--	--	--	--
Ukraine	12 e	18 e	--	--	--	--	--	305,000 e	9,745
Uzbekistan e	--	--	--	--	83	--	--	--	--
Total	343 e	288 e	96,800 e	27,000 e	2,090 e	2,500 e	3,800 e	320,000	69,300
Share of world total	15.2%	20.5%	45.4%	7.9%	9.9%	0.8%	1.2%	5.1%	62.3%
Europe:									
European Free Trade Association (EFTA):									
Iceland	--	--	--	--	--	--	--	--	--
Norway	(4) e	88 e	--	--	--	--	--	1,396,000	--
Switzerland e	--	--	--	--	--	--	--	--	--
Total	(4) e	88 e	--	--	--	--	--	1,400,000	--
Share of world total	(5)	6.2%	--	--	--	--	--	22.1%	--
European Union (EU):									
Austria	--	--	--	--	--	--	--	--	--
Belgium	--	--	--	--	--	--	--	--	--
Bulgaria	--	--	--	--	55 e	--	10 e	--	--
Cyprus	--	--	--	--	--	--	--	--	--
Czech Republic	--	--	--	--	--	--	--	--	--
Denmark-Greenland e	--	--	--	--	--	--	--	--	--
Estonia	--	--	--	--	--	--	--	--	--
Finland	3	55	--	461 e	33	--	--	--	--
France e	--	16	--	--	1	--	--	--	--
Germany	--	--	--	137,645	--	--	--	--	--
Greece	21 e	18 e	--	--	38 e	--	--	--	--
Hungary	--	--	--	--	--	--	--	--	--

See footnotes at end of table.

TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007[1, 2]

(Thousand metric tons unless otherwise specified)

	Metals—Continued								
	Nickel		Platinum-group metals, refined, primary and secondary		Silver, mine output, metal content (metric tons)	Tin		Titanium	
Region and (or) country	Mine output, metal content	Refinery products, metal content	Palladium (kilograms)	Platinum (kilograms)		Mine output, metal content (metric tons)	Metal, primary[3] (metric tons)	Ilmenite, TiO_2 content (metric tons)	Metal sponge, metal content (metric tons)
Central Eurasia and Europe—Continued:									
Europe—Continued:									
European Union (EU)—Continued:									
Ireland[e]	--	--	--	--	4	--	--	--	--
Italy	--	--	--	--	(4) [e]	--	--	--	--
Latvia	--	--	--	--	--	--	--	--	--
Lithuania	--	--	--	--	--	--	--	--	--
Luxembourg	--	--	--	--	--	--	--	--	--
Malta	--	--	--	--	--	--	--	--	--
Netherlands	--	--	--	--	--	--	--	--	--
Poland[e]	--	--	10	20	1,250	--	--	--	--
Portugal	--	--	--	--	24	41	--	--	--
Romania	--	--	--	--	18 [e]	--	--	--	--
Slovakia	--	--	--	--	--	--	--	--	--
Slovenia	--	--	--	--	--	--	--	--	--
Spain[e]	6	--	--	--	4	--	--	--	--
Sweden	--	(4) [e]	--	--	323	--	--	--	--
United Kingdom	--	37	--	--	--	--	--	--	--
Total	31	126	10 [e]	138,000	1,750	41	10	--	--
Share of world total	1.4%	9.0%	(5)	40.3%	8.3%	(5)	0.0%	--	--
Other Europe:									
Albania	--	--	--	--	--	--	--	--	--
Bosnia and Herzegovina	--	--	--	--	--	--	--	--	--
Croatia	--	--	--	--	--	--	--	--	--
Macedonia	--	15	--	--	--	--	--	--	--
Montenegro	--	--	--	--	--	--	--	--	--
Serbia[e]	--	--	15	2	4 [6]	--	--	--	--
Total	--	15	15 [e]	2 [e]	4	--	--	--	--
Share of world total	--	1.1%	(5)	(5)	(5)	--	--	--	--
Total, Europe and Central Eurasia	374	517	96,800	165,000	3,850	2,540	3,810	1,720,000	69,300
Share of world total	16.5%	36.8%	45.4%	48.1%	18.1%	0.8%	1.2%	27.2%	62.3%
United States	--	--	12,800	3,860	1,260	--	--	219,000	--
Share of world total	--	--	6.0%	1.1%	5.9%	--	--	3.5%	--
World total	2,260	1,400	213,000	343,000	21,200	301,000	327,000	6,320,000	111,000

See footnotes at end of table.

TABLE 4—Continued
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007[1, 2]

(Thousand metric tons unless otherwise specified)

	Metals—Continued			Industrial minerals					
		Zinc							
Region and (or) country	Tungsten, mine output, metal content (metric tons)	Mine output, metal content (metric tons)	Metal, primary and secondary (metric tons)	Ammonia, N content	Cement, hydraulic	Diamond, natural, gemstones and industrial (thousand carats)	Phosphate rock, P_2O_5 content	Potash, K_2O equivalent	Salt
Central Eurasia and Europe:									
Central Eurasia: Commonwealth of Independent States (CIS):									
Armenia	--	4,924	--	--	722	--	--	--	35
Azerbaijan	--	--	--	--	1,693	--	--	--	7
Belarus	--	--	--	830[e]	3,820	--	--	4,972	1,665
Georgia[e]	--	400	--	150	450	--	--	--	30
Kazakhstan	--	386,000	358,226	--	5,699	--	60[e]	--	228
Kyrgyzstan	--	--	--	--	1,300[e]	--	--	--	1[e]
Moldova	--	--	--	--	1,060	--	--	--	--
Russia[e]	4,400	185,000	260,000	10,500	59,900[6]	38,300	4,240	6,600	2,200[6]
Tajikistan[e]	--	--	--	25	300	--	--	--	52
Turkmenistan[e]	--	--	--	270	1,500	--	--	--	5
Ukraine	--	--	--	4,200[e]	15,000	--	--	12[e]	5,548
Uzbekistan[e]	--	--	71,800[6]	1,000	5,000	--	140	--	--
Total	4,400[e]	576,000	690,000	17,000	96,400	38,300[e]	4,440[e]	11,600	9,770
Share of world total	8.4%	5.3%	6.1%	12.9%	3.5%	22.9%	8.9%	33.6%	3.9%
Europe:									
European Free Trade Association (EFTA):[e]									
Iceland	--	--	--	--	140	--	--	--	5
Norway	--	--	157,000	350	1,800	--	--	--	--
Switzerland	--	--	--	30	4,000	--	--	--	560
Total	--	--	157,000	380	5,940	--	--	--	565
Share of world total	--	--	1.4%	0.3%	0.2%	--	--	--	0.2%
European Union (EU):									
Austria	435	--	--	(4)[e]	4,600[e]	--	--	--	1,025
Belgium	--	--	281,300	830[e]	9,571	--	--	--	--
Bulgaria	--	16,000[e]	99,992	310[e]	4,100[e]	--	--	--	2,000
Cyprus	--	--	--	--	1,873	--	--	--	--
Czech Republic	--	--	--	225[e]	4,899	--	--	--	--
Denmark-Greenland[e]	--	--	--	2	2,100	--	--	--	600
Estonia	--	--	--	67	937	--	--	--	--
Finland	--	72,118	305,543	101	1,743	--	325[e]	--	--
France[e]	--	--	115[6]	800	22,300	--	--	--	6,140
Germany	--	--	334,891	2,746	33,382[p]	--	--	3,637	15,677
Greece[e]	--	18,000	--	130	15,000	--	--	--	195
Hungary	--	--	--	300[e]	3,552	--	--	--	--

See footnotes at end of table.

TABLE 4—Continued
EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007[1, 2]

(Thousand metric tons unless otherwise specified)

	Metals—Continued			Industrial minerals—Continued					
		Zinc							
Region and (or) country	Tungsten, mine output, metal content (metric tons)	Mine output, metal content (metric tons)	Metal, primary and secondary (metric tons)	Ammonia, N content	Cement, hydraulic	Diamond, natural, gemstones and industrial (thousand carats)	Phosphate rock, P_2O_5 content	Potash, K_2O equivalent	Salt
Central Eurasia and Europe—Continued:									
Europe—Continued:									
European Union (EU)—Continued:									
Ireland[e]	--	400,898 [6]	--	--	4,700	--	--	--	--
Italy	--	--	100,000 [e]	460 [e]	47,541	--	--	--	2,214
Latvia	--	--	--	--	W	--	--	--	--
Lithuania	--	--	--	936	1,105	--	--	--	--
Luxembourg	--	--	--	--	700 [e]	--	--	--	--
Malta	--	--	--	--	--	--	--	--	6 [e]
Netherlands[e]	--	--	231,652 [6]	1,800	2,400	--	--	--	6,000
Poland	--	139,000 [e]	142,000	1,995	16,963	--	--	--	4,391
Portugal	1,067	24,380	--	244 [e]	12,631	--	--	--	591
Romania	--	849	58,342	1,300 [e]	10,061	--	--	--	2,475
Slovakia	--	--	--	525	3,718	--	--	--	150 [e]
Slovenia	--	--	--	--	1,500 [e]	--	--	--	2 [e]
Spain[e]	--	--	503,000	400	54,000	--	--	435	4,350 [6]
Sweden	--	214,576	--	--	2,500 [e]	--	--	--	--
United Kingdom[e]	--	--	--	1,100	11,890 [6]	--	--	427	5,800
Total	1,500	886,000	2,060,000	14,300	274,000	--	325 [e]	4,500	51,600
Share of world total	2.9%	8.2%	18.3%	10.8%	9.8%	--	0.7%	13.0%	20.6%
Other Europe:									
Albania	--	--	--	--	525 [e]	--	--	--	25 [e]
Bosnia and Herzegovina	--	2,000	--	1 [e]	1,283	--	--	--	502
Croatia	--	--	--	400 [e]	3,524	--	--	--	33
Macedonia	--	20,000	--	--	902	--	--	--	--
Montenegro	--	--	--	--	--	--	--	--	20
Serbia	--	1,000	--	85	2,677	--	--	--	30
Total	--	23,000	--	486	8,910	--	--	--	610
Share of world total	--	0.2%	--	0.4%	0.3%	--	--	--	0.2%
Total, Europe and Central Eurasia	5,900	1,490,000	2,900,000	32,100	385,000	38,300	4,770	16,100	62,600
Share of world total	11.3%	13.8%	25.8%	24.3%	13.8%	22.9%	9.5%	46.6%	25.0%
United States	--	803,000	278,000	8,840	96,900	--	8,480	1,100	44,500
Share of world total	--	7.5%	2.5%	6.7%	3.5%	--	17.0%	3.2%	17.8%
World total	52,200	10,800,000	11,300,000	132,000	2,790,000	168,000	50,000	34,500	251,000

See footnotes at end of table.

TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007[1, 2]

(Thousand metric tons unless otherwise specified)

Region and (or) country	Mineral fuels and related materials: Coal: Anthracite	Coal: Bituminous	Coal: Lignite	Natural gas, dry (million cubic meters)	Petroleum, crude (thousand 42-gallon barrels)	Uranium, U_3O_8 content (metric tons)
Central Eurasia and Europe:						
Central Eurasia: Commonwealth of Independent States (CIS):						
Armenia	--	--	--	2,285	--	--
Azerbaijan	--	--	--	10,832	312,120	--
Belarus	--	--	--	201	12,918	--
Georgia[e]	--	8	--	21	466	--
Kazakhstan	--	88,974	4,638	15,699	496,000 [e]	7,827
Kyrgyzstan[e]	--	46	268	19	518 [6]	--
Moldova	--	--	--	NA	--	--
Russia	18,332	218,971	77,200	651,000	3,600,000 [e]	3,762
Tajikistan	--	82	--	19	165 [e]	--
Turkmenistan	--	--	--	72,300	71,565	--
Ukraine	13,000 [e]	62,255	182	21	32,800	846
Uzbekistan	--	87	3,215	65,300	36,172	2,736
Total	31,300	370,000	85,500	818,000	4,560,000	15,200
Share of world total	4.9%	7.9%	8.6%	29.7%	16.7%	33.2%
Europe:						
European Free Trade Association (EFTA):						
Iceland	--	--	--	--	--	--
Norway	--	322	--	130,800	965,000 [e]	--
Switzerland	--	--	--	--	--	--
Total	--	322	--	131,000	965,000 [e]	--
Share of world total	--	(5)	--	4.7%	3.5%	--
European Union (EU):						
Austria[e]	--	--	5	1,400	7,082 [6]	--
Belgium	--	--	--	--	--	--
Bulgaria	--	18	28,159	295	176	NA
Cyprus	--	--	--	--	--	--
Czech Republic	--	12,462	49,571	148	1,627	380
Denmark-Greenland[e]	--	--	--	9,500	113,515 [6]	--
Estonia	--	--	16,647	--	--	--
Finland	--	--	--	--	--	--
France[e]	--	--	--	1,200	7,020	--
Germany	2,003	19,304	180,409	16,884	25,000	48
Greece[e]	--	--	74,000	16	760	--

See footnotes at end of table.

TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007[1, 2]

(Thousand metric tons unless otherwise specified)

	Mineral fuels and related materials					
	Coal					
Region and (or) country	Anthracite	Bituminous	Lignite	Natural gas, dry (million cubic meters)	Petroleum, crude (thousand 42-gallon barrels)	Uranium, U_3O_8 content (metric tons)
Central Eurasia and Europe—Continued:						
Europe—Continued:						
European Union (EU)—Continued:						
Hungary	--	--	9,682	2,653	5,613	--
Ireland	--	--	--	566	--	--
Italy	--	--	--	8,900 e	30,012	--
Latvia	--	--	--	--	--	--
Lithuania	--	--	--	--	1,134	--
Luxembourg	--	--	--	--	--	--
Malta	--	--	--	--	--	--
Netherlands[e]	--	--	--	68,166	11,250	--
Poland	--	88,313	57,538	5,652	5,292	--
Portugal	--	--	--	--	--	--
Romania	--	--	35,418	11,981	36,000 e	--
Slovakia	--	--	2,111	142 p	170 e	--
Slovenia	--	--	4,562	3	2,041	--
Spain	7,869	3,131	6,180	330 e	335	--
Sweden	--	--	--	--	--	--
United Kingdom	1,385	15,645	--	72,000	602,192	--
Total	11,300	139,000	464,000	200,000	849,000	428
Share of world total	1.8%	3.0%	46.5%	7.2%	3.1%	0.9%
Other Europe:						
Albania[e]	--	--	13	11 [6]	3,523	--
Bosnia and Herzegovina	--	--	9,765	--	--	--
Croatia[e]	--	--	--	2,900	6,606	--
Macedonia	--	--	6,569	--	--	--
Montenegro	--	--	1,203	--	--	--
Serbia	--	66	37,007	274	4,690	--
Total	--	66	54,557	3,185	14,819	--
Share of world total	--	(5)	5.5%	0.1%	0.1%	--
Total, Europe and Central Eurasia	42,600	510,000	604,000	1,150,000	6,390,000	15,600
Share of world total	6.7%	10.9%	60.5%	41.8%	23.4%	34.1%
United States	1,410	967,000	71,200	367,000	1,848,000	1,950
Share of world total	0.2%	20.6%	7.1%	13.3%	6.8%	4.3%
World total	640,000	4,690,000	999,000	2,760,000	27,300,000	45,700

See footnotes at end of table.

TABLE 4—Continued

EUROPE AND CENTRAL EURASIA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2007[1, 2]

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[e] Estimated; estimated data, U.S. data, and world totals are rounded to no more than three significant digits; may not add to totals shown.

[p] Preliminary· NA Not available. -- Zero or zero percent. W Withheld to avoid disclosing proprietary data.

[1] Some of the individual entries in this table may differ from those that appear in individual country production tables elsewhere in this volume owing to the inclusion in this table of data received at a later date.

[2] Totals may not add due to independent rounding. Table includes data available as of June 4, 2009.

[3] Primary production also includes undifferentiated (primary and secondary) production for some countries listed.

[4] Less than ½ unit.

[5] Less than 0.5 percent.

[6] Reported figure.

TABLE 5

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED BAUXITE MINE PRODUCTION, 1995-2015[1]

(Thousand metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
France	75	185	168	160	150	160	170	170
Greece	2,200	1,966	2,441	2,163	2,100	2,200	2,200	2,100
Italy	11	300	300	--	--	--	--	--
Total	2,290	2,450	2,910	2,320	2,300	2,400	2,400	2,300
Central Europe:								
Albania	--	5	--	--	--	--	--	--
Bosnia and Herzegovina	75	255	1,032	867	800	850	850	850
Croatia	2	--	--	--	--	--	--	--
Hungary	1,015	1,046	535	546	540	540	540	540
Montenegro[2]	60	630	672	667	500	550	600	600
Romania	175	--	--	--	--	--	--	--
Total	1,330	1,940	2,240	2,080	1,800	1,900	2,000	2,000
Central Eurasia:								
Kazakhstan	3,071	3,729	4,800	4,800	4,600	4,800	4,900	5,000
Russia	3,800	5,274	6,400	6,777	6,000	7,000	8,000	9,000
Total	6,870	9,000	11,200	11,600	11,000	12,000	13,000	14,000
Regional total	10,500	13,400	16,300	16,000	15,000	16,000	17,000	18,000

[e] Estimated. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Prior to 2005, figures are for a combined Serbia and Montenegro.

TABLE 6

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRIMARY AND SECONDARY ALUMINUM PRODUCTION, 1995-2015[1]

(Thousand metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
Austria	94	158	151	152	110	150	150	150
Belgium	4	1	--	(2)	--	--	--	--
Denmark-Greenland	14	16	20	25	25	25	25	25
Finland	35	45	34	44	45	45	45	40
France	603	701	664	650	600	600	600	600
Germany	994	1,216	1,366	1,387	1,100	1,300	1,400	1,400
Greece	133	171	163	166	160	150	150	150
Iceland	100	224	273	396	500	600	600	600
Italy	610	848	847	848	850	850	850	850
Netherlands	407	421	391	301	300	350	350	350
Norway	902	1,280	1,376	1,654	1,600	1,600	1,600	1,600
Portugal	NA	18	18	18	18	18	18	18
Spain	468	606	637	593	550	650	650	650
Sweden	118	127	133	130	130	130	130	130
Switzerland	31	224	238	230	200	200	200	200
United Kingdom	520	590	574	558	500	550	550	550
Total	5,030	6,650	6,890	7,150	6,700	7,200	7,300	7,300
Central Europe:								
Bosnia and Herzegovina	15	95	131	147	100	100	110	120
Bulgaria	5	8	5	13	10	10	10	10
Croatia	31	15	6	3	2	2	2	2
Czech Republic	48	40	15	15	15	15	15	15
Hungary	29	89	81	50	50	50	50	50
Macedonia	4	5	4	NA	1	1	1	1
Montenegro[3]	17	88	117	135	80	100	110	110
Poland	56	52	66	79	75	75	75	75
Romania	144	181	251	298	215	235	250	270
Serbia	NA	NA	(2)	2	1	1	1	2
Slovakia	38	137	158	190	180	190	190	190
Slovenia	58	84	139	111	110	110	110	110
Total	444	794	973	1,040	840	890	920	960
Central Eurasia:								
Azerbaijan	4	--	32	39	30	35	40	60
Kazakhstan	--	--	--	--	120	200	225	225
Russia	2,724	3,245	3,647	3,955	3,400	3,600	3,800	4,000
Tajikistan	232	269	380	419	320	330	350	370
Ukraine	98	233	244	243	200	200	210	220
Uzbekistan	3	2	3	3	3	3	3	3
Total	3,060	3,750	4,310	4,660	4,100	4,400	4,600	4,900
Regional total	8,540	11,200	12,200	12,900	12,000	12,000	13,000	13,000

[e] Estimated. NA Not available. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Less than 1/2 unit.

[3] Prior to 2005, figures are for a combined Serbia and Montenegro.

TABLE 7

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED COPPER MINE PRODUCTION, 1995-2015[1]

(Cu content in thousand metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
Finland	10	14	16	14	12	12	11	11
France	(2)	(2)	--	--	--	--	--	--
Norway	7	--	--	--	--	--	--	--
Portugal	134	76	90	90	85	85	85	85
Spain	25	23	8	7	9	9	9	9
Sweden	84	78	98	63	50	45	40	40
Total	259	192	211	174	160	150	150	150
Central Europe:								
Albania	4	--	2	(2)	(2)	(2)	1	2
Bulgaria	76	92	112	116	110	110	110	110
Macedonia	6	6	22	7	6	6	6	6
Poland	384	509	575	506	500	500	500	520
Romania	25	16	15	2	2	4	4	5
Serbia[3]	75	56	27	32	30	30	30	30
Slovakia	--	(2)	(2)	--	--	--	--	--
Total	569	679	752	663	650	650	650	670
Central Eurasia:								
Armenia	8	12	16	18	16	20	25	30
Georgia	5	8	10	11	10	12	14	40
Kazakhstan	200	430	402	405	380	410	420	430
Russia	525	570	640	740	700	750	750	900
Uzbekistan	40	70	104	95	90	95	105	105
Total	778	1,090	1,170	1,270	1,200	1,300	1,300	1,500
Regional total	1,610	1,960	2,140	2,110	2,000	2,100	2,100	2,300

[e] Estimated. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Less than 1/2 unit.

[3] Prior to 2005, figures are for a combined Serbia and Montenegro.

TABLE 8

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRIMARY AND SECONDARY REFINED COPPER PRODUCTION, 1995-2015[1]

(Thousand metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
Austria	54	79	72	81	100	110	110	110
Belgium	376	423	383	380	400	400	400	350
Cyprus	--	5	--	1	1	1	1	1
Finland	74	114	125	136	140	140	140	140
France	42	2	--	--	--	--	--	--
Germany	616	710	638	666	670	680	690	690
Italy	98	73	32	29	35	35	35	35
Norway	34	27	39	34	35	35	35	35
Spain	164	316	302	290	300	320	320	320
Sweden	105	130	222	239	240	240	240	240
United Kingdom	55	3	--	--	--	--	--	--
Total	1,620	1,880	1,810	1,860	1,900	2,000	2,000	1,900
Central Europe:								
Albania	3	--	--	--	--	--	--	--
Bulgaria	29	32	61	70	170	180	180	180
Czech Republic	20	20	14	NA	10	10	10	10
Hungary	11	12	10	NA	--	--	--	--
Poland	407	486	560	533	512	515	515	515
Romania	27	19	21	19	10	12	16	18
Serbia[2]	79	46	27	31	30	30	30	30
Slovakia	29	--	--	--	--	--	--	--
Total	604	615	693	653	730	750	750	750
Central Eurasia:								
Kazakhstan	256	395	388	406	300	350	375	400
Russia	560	840	933	939	850	900	950	1,100
Uzbekistan	95	85	104	92	85	85	90	95
Total	911	1,320	1,430	1,440	1,200	1,300	1,400	1,600
Regional total	3,130	3,820	3,930	3,950	3,900	4,000	4,100	4,300

[e] Estimated. NA Not available. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Prior to 2005, figures are for a combined Serbia and Montenegro.

TABLE 9

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED GOLD MINE PRODUCTION, 1995-2015[1]

(Kilograms)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
Finland	2,061	4,951	3,747	4,261	3,500	4,000	4,000	4,000
France	4,615	2,632	1,500	1,500	1,500	1,500	1,500	1,500
Italy	--	791	--	--	--	--	--	--
Spain	4,131	4,310	5,300	3,100	3,500	5,500	5,500	5,500
Sweden	6,528	3,570	6,600	5,159	5,200	5,200	5,200	5,000
Total	17,300	16,300	17,100	14,000	14,000	16,000	16,000	16,000
Central Europe:								
Bulgaria	3,100	2,347	3,868	3,964	4,000	4,000	4,000	4,000
Macedonia	760	750	450	450	400	400	400	400
Poland	510	367	713	883	850	850	850	850
Romania	4,000	500	400	400	400	2,000	5,000	5,000
Serbia[2]	3,040	1,121	335	500	450	450	450	450
Slovakia	518	306	109	100	100	100	100	100
Total	11,900	5,390	5,880	6,300	6,200	7,800	11,000	11,000
Central Eurasia:								
Armenia	514	600	1,400	1,400	2,000	2,500	3,000	3,500
Georgia	500	2,924	2,000	2,000	2,500	3,000	3,500	4,000
Kazakhstan	18,200	28,171	18,062	22,000	22,000	22,000	25,000	25,000
Kyrgyzstan	1,500	22,000	16,700	10,636	15,000	18,000	20,000	20,000
Russia	131,900	142,738	163,186	156,912	170,000	170,000	180,000	190,000
Tajikistan	1,500	2,700	3,000	3,000	3,500	4,000	5,500	6,000
Ukraine	--	--	--	500	500	500	500	500
Uzbekistan	65,000	85,000	84,210	85,000	85,000	90,000	90,000	95,000
Total	219,000	284,000	289,000	281,000	300,000	310,000	330,000	340,000
Regional total	248,000	306,000	312,000	302,000	320,000	330,000	350,000	370,000

[e] Estimated. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Prior to 2005, figures are for a combined Serbia and Montenegro.

TABLE 10

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED IRON ORE MINE PRODUCTION, 1995-2015[1]

(Fe content in thousand metric tons)

Region and country	Average iron content	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:									
Western Europe:									
Austria	33%	709	586	655	688	600	650	650	650
France	28%	432	--	--	--	--	--	--	--
Germany[2]	14%	10	65	38	44	40	40	40	40
Greece	38%	800	575	575	575	575	500	500	500
Norway	62%	1,348	369	420	1,437	1,200	1,200	1,200	1,000
Portugal	36%	5	12	10	10	10	10	10	10
Spain	38%	960	--	--	--	--	--	--	--
Sweden	65%	13,880	13,556	15,300	16,100	17,000	17,000	17,000	17,000
United Kingdom	54%	1	1	(3)	(3)	(3)	(3)	(3)	(3)
Total	XX	18,100	15,200	17,000	18,900	19,000	19,000	19,000	19,000
Central Europe:									
Bosnia and Herzegovina	53%	52	182	1,500	1,236	1,000	1,200	1,200	1,400
Bulgaria	50%	265	178	--	--	--	--	--	--
Czech Republic	29%	10	6	--	--	--	--	--	--
Macedonia	40%	1	9	--	--	--	--	--	--
Romania	52%	147	55	69	11	10	10	10	10
Serbia and Montenegro	45%	61	1	--	--	--	--	--	--
Slovakia	34%	225	255	259	200	200	200	200	200
Total	XX	761	686	1,830	1,450	1,200	1,400	1,400	1,600
Central Eurasia:									
Azerbaijan	57%	1	--	4	9	8	10	13	15
Kazakhstan	57%	8,500	9,200	9,300	13,600	12,000	13,000	14,000	14,000
Russia	58%	46,000	50,000	56,100	60,800	58,000	60,000	61,000	62,000
Ukraine	55%	29,000	30,600	37,700	42,800	38,000	40,000	42,000	43,000
Total	XX	83,500	89,800	103,000	117,000	110,000	110,000	120,000	120,000
Regional total	XX	102,000	106,000	122,000	138,000	130,000	130,000	140,000	140,000

[e] Estimated. XX Not Applicable. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Iron ore is used domestically as an additive in cement and other construction materials but is of too low a grade to use in the steel industry.

[3] Less than 1/2 unit.

TABLE 11
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED CRUDE STEEL PRODUCTION, 1995-2015[1]

(Thousand metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
Austria	4,537	5,725	7,031	6,871	5,000	6,500	7,000	7,000
Belgium	11,606	11,635	10,420	10,692	5,000	7,000	9,000	10,000
Denmark-Greenland	654	803	--	--	--	--	--	--
Finland	3,176	4,096	4,738	4,431	3,000	4,000	5,000	5,000
France	18,096	21,002	19,481	19,252	11,500	15,000	19,000	19,000
Germany	42,051	46,376	44,524	48,550	35,000	45,000	46,000	47,000
Greece	939	1,088	2,266	2,550	2,500	2,500	2,500	2,500
Ireland	309	342	--	--	--	--	--	--
Italy	27,766	26,544	29,061	31,990	19,500	25,500	30,000	30,000
Luxembourg	2,613	2,571	2,194	2,858	2,000	2,800	2,800	2,800
Netherlands	6,409	5,667	6,919	7,368	4,000	5,000	7,000	7,000
Norway	503	620	701	740	700	700	700	700
Portugal	829	1,097	725	1,400	1,400	1,400	1,400	1,400
Spain	13,975	15,844	17,800	19,000	15,000	17,000	19,000	19,000
Sweden	4,953	5,227	5,692	5,700	3,000	4,000	5,500	5,500
Switzerland	1,000	1,020	1,158	1,264	1,000	1,200	1,200	1,200
United Kingdom	17,604	15,306	13,210	14,300	10,000	13,000	14,000	14,000
Total	157,000	165,000	166,000	177,000	120,000	150,000	170,000	170,000
Central Europe:								
Albania	22	65	87	100	300	300	300	300
Bosnia and Herzegovina	--	134	283	514	350	400	450	500
Bulgaria	2,724	2,023	1,969	2,050	1,200	1,600	2,000	2,000
Croatia	45	71	74	75	70	75	75	75
Czech Republic	7,189	6,216	6,189	7,059	5,000	6,000	6,000	7,000
Hungary	1,865	1,969	2,005	2,317	1,800	1,800	2,000	2,000
Macedonia	33	161	326	372	360	360	360	360
Montenegro	NA	NA	104	174	150	170	170	170
Poland	11,890	10,508	8,336	10,621	9,500	10,000	10,000	10,500
Romania	6,557	4,672	6,280	6,261	6,000	6,200	6,200	6,200
Serbia[2]	180	682	1,286	1,478	1,100	1,200	1,300	1,400
Slovakia	3,958	3,733	4,242	4,800	4,000	4,500	4,500	4,500
Slovenia	407	519	583	638	630	630	630	630
Total	34,900	30,800	31,800	36,500	30,000	33,000	34,000	36,000
Central Eurasia:								
Azerbaijan	12	--	286	274	250	275	300	300
Belarus	744	1,623	2,076	2,387	1,800	1,900	2,100	2,300
Georgia	84	(3)	--	--	--	100	200	200
Kazakhstan	3,030	4,770	4,452	4,784	4,200	4,300	4,500	4,700
Latvia	279	500	550	W	500	550	550	550
Moldova	663	909	1,000	995	800	850	900	1,000
Russia	51,600	59,097	66,186	72,389	68,000	70,000	72,000	75,000
Ukraine	23,309	31,780	38,636	42,830	38,000	40,000	42,000	45,000
Uzbekistan	352	420	607	740	750	800	800	800
Total	80,100	99,100	114,000	124,000	110,000	120,000	120,000	130,000
Regional total	272,000	295,000	311,000	338,000	260,000	300,000	330,000	340,000

[e] Estimated. NA Not available. W Withheld to avoid disclosing proprietary data. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Prior to 2005, figures are for a combined Serbia and Montenegro.

[3] Less than 1/2 unit.

TABLE 12

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED LEAD MINE PRODUCTION, 1995-2015[1]

(Pb content in thousand metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
Greece	14	18	3	15	16	18	18	18
Ireland	46	58	64	54	60	60	60	60
Italy	15	2	1	1	1	1	1	1
Spain	30	40	--	--	--	--	--	--
Sweden	137	106	60	63	60	60	50	40
United Kingdom	2	1	1	(2)	(2)	(2)	(2)	(2)
Total	244	225	129	133	140	140	130	120
Central Europe:								
Bosnia and Herzegovina	(2)	(2)	1	(2)	(2)	(2)	(2)	(2)
Bulgaria	33	11	32	24	20	20	20	20
Macedonia	17	24	--	32	15	15	15	15
Poland	99	114	100	96	85	85	80	70
Romania	23	19	12	1	1	1	1	1
Serbia[3]	3	11	1	1	1	1	1	1
Total	175	179	146	154	120	120	120	110
Central Eurasia:								
Georgia	NA	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Kazakhstan	40	40	31	40	41	45	50	55
Russia	23	13	36	50	40	41	42	45
Tajikistan	1	1	--	(4)	--	--	--	--
Total	64	54	67	90	81	86	92	100
Regional total	483	458	342	377	340	350	340	330

[e] Estimated. NA Not available. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Less than 1/2 unit.

[3] Prior to 2005, figures are for a combined Serbia and Montenegro.

TABLE 13

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRIMARY AND SECONDARY REFINED LEAD PRODUCTION, 1995-2015[1]

(Thousand metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
Austria	22	24	22	22	20	22	22	22
Belgium	122	119	103	97	100	100	100	100
France	297	268	105	92	90	90	90	90
Germany	314	374	342	355	340	350	350	350
Greece	5	5	4	4	5	5	5	5
Ireland	11	9	20	23	22	22	22	22
Italy	180	235	211	212	200	200	200	200
Netherlands	20	22	17	16	16	16	16	16
Portugal	8	5	3	3	3	3	3	3
Spain	80	120	110	110	110	110	110	110
Sweden	91	78	79	78	75	70	70	70
Switzerland	6	10	8	9	9	9	9	9
United Kingdom	321	337	304	308	300	300	300	300
Total	1,480	1,610	1,330	1,330	1,300	1,300	1,300	1,300
Central Europe:								
Bosnia and Herzegovina	(2)	(2)	(2)	(2)	--	--	--	--
Bulgaria	72	84	94	87	84	84	84	84
Czech Republic	20	25	26	26	26	26	26	26
Estonia	--	1	7	10	10	11	12	13
Macedonia	23	23	--	--	--	5	5	5
Poland	66	56	81	104	100	100	100	100
Romania	26	28	38	39	10	15	20	25
Serbia[3]	24	1	1	1	1	1	1	1
Slovenia	7	15	15	15	15	15	15	15
Total	238	233	262	282	250	260	260	270
Central Eurasia:								
Kazakhstan	89	186	135	118	110	120	130	140
Russia	23	59	66	94	75	80	90	95
Ukraine	10	15	61	62	55	60	60	65
Total	122	260	262	274	240	260	280	300
Regional total	1,840	2,100	1,850	1,890	1,800	1,800	1,800	1,900

[e] Estimated. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Less than 1/2 unit.

[3] Prior to 2005, figures are for a combined Serbia and Montenegro.

TABLE 14
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED NICKEL MINE PRODUCTION, 1995-2015[1]

(Ni content in metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
Finland	3,439	3,347	3,386	3,465	3,500	4,000	4,000	4,000
Greece	19,900	19,535	23,210	21,200	22,000	22,000	22,000	22,000
Norway	3,386	2,538	130	300	200	200	100	100
Spain	--	--	5,380	6,400	8,000	10,000	10,000	10,000
Total	26,700	25,400	32,100	31,400	34,000	36,000	36,000	36,000
Central Europe, Macedonia	3,500	--	5,000	8,000	8,000	8,000	8,000	8,000
Central Eurasia:								
Russia	251,000	315,000	315,000	331,000	320,000	320,000	330,000	340,000
Ukraine	1,400	--	2,000	12,000	12,000	12,000	12,000	12,000
Total	252,000	315,000	317,000	343,000	330,000	330,000	340,000	350,000
Regional total	283,000	340,000	354,000	382,000	370,000	380,000	390,000	400,000

[e] Estimated. -- Negligible or no production.

[1] Estimated data, and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 15
EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PLATINUM MINE PRODUCTION, 1995-2015[1]

(Kilograms)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
Finland	37	441	678	461	500	500	500	500
Norway[2]	1,500	1,000	--	--	--	--	--	--
Total	1,540	1,440	678	461	500	500	500	500
Central Europe:								
Poland	21	21	20	20	18	20	20	20
Serbia[3]	6	3	3	2	1	1	1	1
Total	27	24	23	22	19	21	21	21
Central Eurasia, Russia	31,000	27,000	29,000	27,000	25,000	26,000	27,000	28,000
Regional total	32,600	28,500	29,700	27,500	26,000	27,000	28,000	29,000

[e] Estimated. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Data prior to 2005 represent exports.

[3] Prior to 2005, figures are for a combined Serbia and Montenegro.

TABLE 16

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PALLADIUM MINE PRODUCTION, 1995-2015[1]

(Kilograms)

Region and country[2]	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Central Europe:								
Poland	12	12	10	10	9	10	10	10
Serbia[3]	46	21	19	15	10	10	10	10
Total	58	33	29	25	19	20	20	20
Central Eurasia, Russia	65,000	95,000	97,400	96,800	95,000	96,000	98,000	100,000
Regional total	65,100	95,000	97,400	96,800	95,000	96,000	98,000	100,000

[e] Estimated.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Palladium production for Finland and Norway has not been estimated.

[3] Prior to 2005, figures are for a combined Serbia and Montenegro.

TABLE 17

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED TIN MINE PRODUCTION, 1995-2015[1]

(Sn content in metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
Portugal	200	218	243	41	50	50	50	50
Spain	250	233	--	--	--	--	--	--
Total	450	451	243	41	50	50	50	50
Central Eurasia:								
Kazakhstan	15	--	--	--	--	--	--	--
Kyrgyzstan	--	300	--	--	--	--	--	--
Russia	2,000	2,500	3,000	2,500	1,500	1,800	2,000	2,400
Total	2,020	2,800	3,000	2,500	1,500	1,800	2,000	2,400
Regional total	2,500	3,300	3,200	2,500	1,600	1,800	2,000	2,400

[e] Estimated. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 18

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRIMARY AND SECONDARY REFINED TIN PRODUCTION, 1995-2015[1]

(Metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe, France	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Central Eurasia, Russia	4,500	5,300	5,500	4,200	2,200	2,600	3,000	3,800
Regional total	6,000	6,800	7,000	5,700	3,700	4,100	4,500	5,300

[e] Estimated.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 19

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED ZINC MINE PRODUCTION, 1995-2015[1]

(Zn content in thousand metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
Finland	16	30	72	72	70	70	65	65
Greece	15	20	1	18	22	22	20	20
Ireland	184	263	429	401	425	425	400	400
Italy	23	--	--	--	--	--	--	--
Norway	10	--	--	--	--	--	--	--
Portugal	--	--	--	24	100	120	135	135
Spain	172	200	--	--	--	--	--	--
Sweden	167	177	216	215	215	200	200	200
Total	587	690	718	730	830	840	820	820
Central Europe:								
Bosnia and Herzegovina	(2)	(2)	3	2	2	2	2	2
Bulgaria	26	9	22	16	15	15	15	15
Macedonia	8	25	--	20	20	30	30	30
Poland	155	157	156	142	140	140	140	140
Romania	35	27	14	(2)	(2)	(2)	(2)	(2)
Serbia[3]	3	3	(2)	1	1	1	1	1
Total	227	221	195	181	180	190	190	190
Central Eurasia:								
Armenia	(2)	(2)	3	5	4	5	5	5
Georgia	--	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Kazakhstan	225	325	400	386	400	400	425	450
Russia	131	136	180	185	150	175	200	250
Total	356	461	583	576	550	580	630	710
Regional total	1,170	1,370	1,500	1,490	1,600	1,600	1,600	1,700

[e] Estimated. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Less than 1/2 unit.

[2] Prior to 2005, figures are for a combined Serbia and Montenegro.

TABLE 20

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PRIMARY AND SECONDARY REFINED ZINC PRODUCTION, 1995-2015[1]

(Thousand metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
Belgium	240	252	262	281	275	275	250	250
Finland	177	223	282	306	300	290	280	280
France	314	348	210	115	115	120	120	120
Germany	322	357	335	335	180	200	200	200
Italy	260	170	121	100	110	110	110	110
Netherlands	208	217	214	232	230	230	230	230
Norway	123	126	151	157	160	160	160	150
Spain	364	387	501	503	500	500	500	500
United Kingdom	106	100	--	--	--	--	--	--
Total	2,110	2,180	2,080	2,030	1,900	1,900	1,900	1,800
Central Europe:								
Bulgaria	80	84	95	100	100	100	100	100
Czech Republic	1	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Macedonia	21	63	--	--	--	5	10	10
Poland	166	173	137	142	140	140	140	140
Romania	28	52	57	58	30	40	40	40
Serbia[3]	6	8	18	--	--	--	--	--
Total	302	380	307	300	270	290	290	290
Central Eurasia:								
Kazakhstan	239	262	357	358	320	330	340	360
Russia	166	230	220	260	230	280	300	310
Uzbekistan	70	18	35	72	40	50	60	70
Total	475	510	612	690	590	660	700	740
Regional total	2,890	3,070	3,000	3,020	2,700	2,800	2,800	2,900

[e] Estimated. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Less than 1/2 unit.

[3] Prior to 2005, figures are for a combined Serbia and Montenegro.

TABLE 21

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED NATURAL DIAMOND PRODUCTION, 1995-2015[1, 2]

(Thousand carats)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Central Eurasia, Russia:								
Gem grade	17,000	17,500	23,000	23,300	22,000	22,000	22,500	23,000
Industrial grade	11,000	11,700	15,000	15,000	15,000	15,000	15,000	15,000
Regional total	28,000	29,200	38,000	38,300	37,000	37,000	38,000	38,000

[e] Estimated.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] The large increase in Russian diamond production reported in 2005 reflects mainly newly released Russian diamond production data.

TABLE 22

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED PHOSPHATE ROCK PRODUCTION, 1995-2015[1]

(P_2O_5 content in thousand metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe, Finland	244	277	301	325	300	300	300	300
Central Eurasia:								
Kazakhstan	2	10	55	60	120	150	150	200
Russia	3,400	4,450	4,220	4,240	4,400	4,400	4,500	4,600
Uzbekistan	--	36	102	140	150	170	180	200
Total	3,400	4,500	4,380	4,440	4,700	4,700	4,800	5,000
Regional total	3,650	4,770	4,680	4,770	5,000	5,000	5,100	5,300

[e] Estimated. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 23

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED POTASH PRODUCTION, 1995-2015[1]

(K_2O equivalent in thousand metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
Germany	3,278	3,407	3,664	3,637	2,300	3,500	3,500	3,500
Spain	700	712	575	435	450	450	450	450
United Kingdom	560	500	732	716	710	710	710	710
Total	4,540	4,620	4,970	4,790	3,500	4,700	4,700	4,700
Central Eurasia:								
Belarus	2,795	3,372	4,605	4,972	5,000	5,000	5,100	5,200
Russia	2,800	4,450	7,131	6,600	7,500	8,000	9,000	10,000
Ukraine	56	20	13	12	12	12	12	12
Total	5,650	7,840	11,700	11,600	13,000	13,000	14,000	15,000
Regional total	10,200	12,500	16,700	16,400	16,000	18,000	19,000	20,000

[e] Estimated.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

TABLE 24

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED SALABLE COAL PRODUCTION, 1995-2015[1, 2]

(Thousand metric tons)

Region and country	1995	2000	2005	2007	2009^{e}	2011^{e}	2013^{e}	2015^{e}
Europe:								
Western Europe:								
Austria	1,282	1,255	6	5	--	--	--	--
France	8,416	4,102	--	--	--	--	--	--
Germany	246,322	201,975	202,815	201,716	200,000	190,000	190,000	180,000
Greece	56,533	64,026	73,585	74,000	75,000	75,000	75,000	75,000
Italy	352	19	--	--	--	--	--	--
Norway	343	330	300	322	320	300	300	200
Spain	28,476	23,470	19,354	17,180	20,000	20,000	20,000	20,000
United Kingdom	53,600	31,972	20,498	17,030	20,000	20,000	20,000	20,000
Total	395,000	327,000	317,000	310,000	320,000	310,000	310,000	300,000
Central Europe:								
Albania	81	21	13	13	13	13	13	13
Bosnia and Herzegovina	1,808	7,441	9,144	9,765	9,700	9,700	9,700	9,700
Bulgaria	30,830	27,094	24,909	28,177	22,000	22,000	22,000	22,000
Croatia	75	--	--	--	--	--	--	--
Czech Republic	80,082	68,091	61,903	61,033	60,000	60,000	60,000	60,000
Hungary	14,453	14,276	9,580	9,682	9,600	9,600	9,600	9,600
Macedonia	7,991	7,516	6,880	6,569	8,000	8,000	8,000	8,000
Montenegro	NA	NA	1,297	1,202	1,000	1,000	1,000	1,000
Poland	200,713	162,815	159,039	145,851	140,000	135,000	135,000	135,000
Romania	41,128	29,294	31,122	35,418	35,000	25,000	25,000	25,000
Serbia[3]	40,556	32,275	34,993	37,073	35,000	35,000	35,000	35,000
Slovakia	4,140	3,589	2,511	2,111	2,000	2,000	2,000	2,000
Slovenia	4,884	4,480	4,539	4,562	4,500	4,500	4,500	4,500
Total	427,000	357,000	346,000	341,000	330,000	310,000	310,000	310,000
Central Eurasia:								
Georgia	40	7	5	8	10	10	10	11
Kazakhstan	113,000	74,872	86,385	93,612	80,000	85,000	90,000	95,000
Kyrgyzstan	463	425	340	353	400	450	500	550
Russia	263,000	273,578	298,300	314,500	270,000	290,000	300,000	320,000
Tajikistan	100	21	99	82	70	80	90	100
Ukraine	83,800	81,907	74,559	75,437	70,000	75,000	80,000	85,000
Uzbekistan	3,200	2,556	3,000	3,020	3,000	3,500	4,000	4,500
Total	464,000	433,000	463,000	487,000	420,000	450,000	470,000	510,000
Regional total	1,290,000	1,120,000	1,130,000	1,140,000	1,100,000	1,100,000	1,100,000	1,100,000

^{e}Estimated. NA Not available. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

[2] Includes anthracite, bituminous, and run-of-mine lignite.

[3] Prior to 2005, figures are for a combined Serbia and Montenegro.

TABLE 25

EUROPE AND CENTRAL EURASIA: HISTORIC AND PROJECTED URANIUM PRODUCTION, 1995-2015[1]

(U_3O_8 content in metric tons)

Region and country	1995	2000	2005	2007	2009[e]	2011[e]	2013[e]	2015[e]
Europe:								
Western Europe:								
France	840	375	--	--	--	--	--	--
Germany	41	33	111	48	40	20	--	--
Portugal	22	16	--	--	--	--	--	--
Spain	420	347	--	--	--	--	--	--
Total	1,320	771	111	48	40	20	--	--
Central Europe:								
Bulgaria	700	700	600	NA	--	--	--	--
Czech Republic	721	587	482	380	400	400	400	400
Hungary	277	--	--	--	--	--	--	--
Total	1,700	1,290	1,080	380	400	400	400	400
Central Eurasia:								
Kazakhstan	1,920	2,052	5,138	7,827	12,000	13,000	15,000	16,000
Russia	2,650	2,948	4,045	3,762	4,000	4,300	4,600	5,000
Ukraine	590	708	800	846	1,200	1,300	1,400	1,400
Uzbekistan	2,100	2,771	2,712	2,736	2,800	3,500	4,000	4,200
Total	7,260	8,480	12,700	15,200	20,000	22,000	25,000	27,000
Regional total	10,300	10,500	13,900	15,600	20,000	23,000	25,000	27,000

[e] Estimated. NA Not available. -- Negligible or no production.

[1] Estimated data and totals are rounded to no more than three significant digits; may not add to totals shown.

THE MINERAL INDUSTRY OF ALBANIA

By Mark Brininstool

Albania's important mineral deposits included chromium, copper, iron ore, and such mineral fuels as natural gas and petroleum. Potential developments in the mineral sector could become an important part of Albania's future economic growth as privatization continues and the number of exploration projects increases.

Minerals in the National Economy

In 2007, Albania's economy continued to develop as indicated by the 6% growth in the gross domestic product (GDP) and an inflation rate of only 2.9% (International Monetary Fund, 2008, p. 264, 270). Industrial production made up about 8% of the GDP, and the mineral extraction industry accounted for about 16% of the value of industrial production (Institute of Statistics of the Republic of Albania, 2008).

Production

In 2007, production of chromite as measured by gross weight increased by about 54% compared with production in 2006 whereas ferrochromium production was believed to have been suspended in 2007. No copper ore was produced in 2007, and crude steel production was estimated to have maintained its 2006 level of output. Production of industrial minerals was estimated to have remained at 2006 levels as well, whereas production of crude petroleum was estimated to have significantly increased.

Structure of the Mineral Industry

Privatization efforts continued in 2007, resulting in increased exploration and production activities by private multinational companies. Table 2 gives the locations of important mineral production facilities in Albania, although at the time of the publication of this report, not enough information had been gathered to list the operating companies.

Commodity Review

Metals

Chromium.—The rights to chromite mines near Bulquize and the Burrel and the Elbasan ferrochromium plants were acquired in 2007 by a partnership of the Austrian firm DCM DECOmetal GmbH and the Russian firm Terwingo Ltd. The partnership announced plans to increase investment significantly at its new facilities to increase annual production of marketable chromite ore and concentrate to 100,000 metric tons (t) from approximately 82,000 t and to achieve annual production of 33,000 t of low carbon ferrochromium and 15,000 t of high carbon ferrochromium. Production of ferrochromium was expected to be restarted at the end of 2007 or the beginning of 2008 (DCM DECOmetal GmbH, 2007; 2008a, b; Metal-Pages, 2007).

Nickel.—European Nickel PLC (ENickel) continued to make progress on exploratory drilling at its Devolli nickel project in southeastern Albania. ENickel reported inferred resources of 35.6 million metric tons of nickel ore with an average grade of 1.20% in November 2007 and planned to complete its initial project study in 2008 (European Nickel PLC, 2008, p. 3, 8).

Industrial Minerals

Important developments in the industrial minerals sector took place in the cement industry. The Greek company Antea Cement Sh.A. (a subsidiary of the Titan Group) and Spanish company Cementos Aquila sh.p.k. (a subsidiary of Grupo Empresarial Aricam) each were granted permits to construct cement manufacturing plants in Albania. Antea intended to invest about $125 million[1] into the construction of a 1.5-million-metric-ton-per-year (Mt/yr)-capacity cement plant in the Kruje region with an expected completion date of late 2009 (Titan Group, 2008a, p. 52; b, p. 48). Cementos Aquila planned to invest about $145 million to construct a plant in Mamurras with an initial capacity of 1.3 Mt/yr and an eventual capacity of 2.6 Mt/yr. The Mamurras plant was expected to begin operations in 2010 (Grupo Empresarial Aricam, 2008).

Mineral Fuels

Crude petroleum production was estimated to have increased by about 50% in 2007 to an estimated 480,000 t. The estimated increase was the result of a 39% increase in the average oil production at Bankers Petroleum Ltd.'s Patos Marinza oilfield to 4,724 barrels per day (bbl/d). The company expected to increase production at Patos Marinza to 7,500 bbl/d by the end of 2008 and to 20,000 bbl/d by 2010 (Bankers Petroleum Ltd., 2008, p. 4, 7-8, 12). Natural asphalt and bitumen production increased by 17% compared with production in 2006.

Outlook

The development of additional mineral exploration and development projects in Albania will likely depend on the country's ability to attract foreign investment and further its privatization program. Improvements to the business environment in Albania could increase foreign investment and increase domestic economic activity, which could result in increases in mineral production.

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[1] Where necessary, values have been converted from European Union euros (€) to U.S. dollars (US$) at the rate of 0.73€=US$1.00.

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TABLE 1
ALBANIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
METALS						
Bauxite[e]		5,000	--	-- [3]	--	--
Chromium:						
Chromite, gross weight		220,000 [e]	160,300	170,000	210,120	323,570
Marketable ore and concentrate:						
Marketable ore (41.6% Cr_2O_3)[e]		89,000	40,000	50,000	55,000 [r]	75,000
Concentrate[e]		10,000	14,430 [3]	16,270 [3]	17,000 [r]	25,000
Total		99,000	54,430	66,270	72,000 [e, r]	100,000 [e]
Copper:						
Ore, gross weight		--	29,030	73,000	10,000	--
Concentrate:						
Gross weight		--	3,210	8,480	2,000	--
Cu content[e]		--	642	1,696 [3]	400	--
Iron and steel:						
Metal, ferroalloys, ferrochromium		37,800	34,650	34,400	17,040	--
Steel:						
Crude steel		86,117	98,026	87,000	100,000	100,000 [e]
Rolled steel		86,000 [r]	98,000 [r]	100,000	114,000 [r]	115,000 [e]
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand metric tons	578	573 [r]	489 [r]	525 [r]	525 [e]
Clay, kaolin[e]	do.	--	300	310 [3]	300	300
Dolomite[e]		1,500,000	1,613,000 [3]	1,000,000 [3]	1,000,000	1,000,000
Olivinite[e]		200	200	200	200	200
Salt[e]		21,448 [3]	24,783 [3]	25,000	25,000	25,000
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bitumen, natural[4]		42,076	61,035	86,000 [r]	83,000 [r]	69,000
Coal, lignite	thousand metric tons	18,000	12,600	13,100	13,000	13,200 [e]
Gas, natural, gross production[5]	thousand cubic meters	11,617	11,965	11,347	11,091 [r]	11,089
Petroleum:						
Coke		57,541	58,712	60,000 [r]	64,000 [r]	59,000
Crude, gross weight		359,253	386,000 [r]	349,000 [r]	316,000 [r]	480,000 [e]

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through March 31, 2009.

[2] In addition to the commodities listed, a variety of industrial minerals and construction materials (common clay, quartz, sand and gravel, stone, and titanomagnetite) are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output.

[3] Reported figure.

[4] Includes asphalt and bitumen produced at petroleum refineries.

[5] Separate data on marketable production are not available, but gross and marketed output are regarded as being nearly equal.

TABLE 2
ALBANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1]

(Thousand metric tons unless otherwise specified)

Commodity		Location of main facilities	Annual capacity
Cement		Elbasan, 32 kilometers southeast of Tirana; Kruje, 20 kilometers northwest of Tirana; Shkoder, 85 kilometers northwest of Tirana; and Vlore, southwest of Tirana	1,200
Chromite		Bater (including Bater I and II and Martanesh), 40 kilometers northwest of Tirana	450
Do.		Bulquize (including Bulqize south, Fush, Terrnove, and Todo Maco), 35 kilometers northwest of Tirana	450
Do.		Kalimash, 60 kilometers north of Tirana	250
Do.		Kam, 70 kilometers north of Tirana	100
Do.		Klos, 20 kilometers northeast of Tirana	50
Do.		Pogradec (including Katjiel, Memelisht, Pojske, Pishkash, and Prrenjas), 50 kilometers east of Tirana	100
Coal, lignite		Maneze, Mezes, and Valias Mines in Tirana Durres area; Krabe Mine, 20 kilometers southeast of Tirana; Alarup and Cervnake Mines, in Pogradec area, 80 kilometers southeast of Tirana; Mborje-Drenove Mine in Korce area, 85 kilometers southwest of Tirana; and Memaliaj Mine in Tepelene area, 110 kilometers south of Tirana	18,000
Copper:			
Ore		Fushe-Arrez, 80 kilometers north of Tirana	350
Do.		Gjejan, 100 kilometers northeast of Tirana	150
Do.		Golaj (including Nikoliq and Pus), 120 kilometers northeast of Tirana	150
Do.		Kurbnesh-Perlat, 55 kilometers northeast of Tirana	100
Do.		Rehove, 110 kilometers southeast of Tirana	100
Do.		Reps (including Gurch, Lajo, Spac, and Thurr), 55 kilometers north of Tirana	350
Do.		Rreshen, 50 kilometers north of Tirana	50
Do.		Shkoder (including Palaj, Karma I and II), 85 kilometers northwest of Tirana	100
Smelter		Kukes, 110 kilometers northeast of Tirana	6
Do.		Lac, 35 kilometers northwest of Tirana	7
Do.		Rubik, 50 kilometers north of Tirana	4
Ferrochromium		Burrel, 35 kilometers northeast of Tirana	40
Do.		Elbasan, 32 kilometers southeast of Tirana	36
Iron ore		Prrenjas (Bushtrica, Prrenjas, Skorska I and II), 70 kilometers southeast of Tirana	650
Do.		Guri i Kuq (including Cervenake, Grasishta, Guri i Kuq, Hudenisht, and Guri Pergjrgjur), 25 kilometers east of Tirana	500
Natural gas	million cubic feet	Gasfields in southwest Albania between Ballsh and Fier	16,000
Nickel, smelter		Elbasan	6
Petroleum:			
Crude	42-gallon barrels per day	Oilfields at Marineze, Ballsh, Shqisht, Patos, Kucova, Gorrisht, and others	35,000
Refined	do.	Refineries: Ballsh, Cerrik, Fier, and Stalin	33,000
Steel		Steel of the Party Metallurgical Combine at Elbasan	150

Do., do. Ditto.

[1] A substantial portion of these enterprises have been operating significantly below capacity during the transition to a market economy; the capacities provided in this table represent only the latest available information and may not show the true status of these enterprises.

THE MINERAL INDUSTRY OF ARMENIA

By Richard M. Levine and Glenn J. Wallace

Armenia was a major producer of molybdenum and ranked an estimated eighth in the world in mine output in 2007 (Magyar, 2008). Besides molybdenum, Armenia produced other metals, which included copper, gold, silver, and zinc, and industrial minerals, which included cement, diatomite, gypsum, limestone, and perlite. The country also produced aluminum foil using aluminum imported from Russia, and ferromolybdenum, molybdenum metal, and rhenium salt from local ores. It also had developed a diamond-cutting industry based on imported raw materials. The country had almost no domestic mineral fuel production and relied for electric power on a domestic nuclear powerplant and hydroelectric plants. It imported fuel for its nuclear powerplant and natural gas from Russia.

Armenia possesses significant resources of copper, gold, iron, lead, molybdenum, and zinc. It is also has resources of construction material (basalt, granite, limestone, marble, tuff, and so forth), semiprecious stones (agate, jasper, obsidian, and so forth), and other nonmetallic minerals, such as bentonite, diatomite, perlite, and zeolite. The copper, copper-molybdenum, and copper-polymetallic deposits in the north of Armenia contain about 475 million metric tons (Mt) of ore. The Zangezur copper-molybdenum complex possesses large molybdenum reserves, which are concentrated in the Kadzharan deposit. Gold reserves at the Zod deposit, which was being mined by Ararat Gold Recovery Co. (ARGC) are reportedly 80 metric tons (t) (Interfax Russia & CIS Metals and Mining Weekly, 2007a).

Minerals in the National Economy

The industrial sector, of which mining and metallurgical production were a part, accounted for about one-third of Armenia's gross domestic product (GDP) (U.S. Central Intelligence Agency, 2009). Mineral products, however, provided a larger portion of Armenia's export revenue earnings. In 2006 (the latest year for which data were available), total exports of goods and services accounted for $986 million, of which the category precious metals and products accounted for 30.5%; nonprecious metals and products made of them, 28.5%; and mineral products, 13.9%. Armenia's main export partners were the European Union (EU), Iran, Israel, Russia, and the United States. In 2006, imports of goods and services were valued at $2,191 million, of which the category precious stones and metals and products accounted for 16.7%; mineral products, 14.3%; and nonprecious metals and products made of them, 13.9% (Hovhannisyan, 2007).

Production

In 2007, mineral production decreased for two of the country's leading mineral commodities; blister copper production decreased by 21% and cut diamond production decreased by 33%. Significant production increases, however, took place for caustic soda, cement, ferromolybdenum, and zinc concentrate. Data on mineral production are in table 1.

Structure of the Mineral Industry

Foreign investors controlled a significant share of Armenia's mineral industry. Armenal, which operated the Kanaker foil mill, was a subsidiary of United Company RUSAL of Russia. The Zangezur copper-molybdenum complex was privatized at the end of 2004, and was owned by Cronimet Mining GmbH from Germany (60%), Open Joint Stock Company (OJSC) Yerevan Pure Iron Works (15%), and Armenian Molybdenum Production LLC (AMP) and LLC Zangezur Mining, which represented the enterprise's former management (12.5% each) (Interfax Russia & CIS Metals and Mining Weekly, 2007f). In 2003, the Agarak copper-molybdenum complex was purchased by Comsup Commodities, Inc. of the United States. The Kapan ore beneficiation plant, which processed copper ore from the Kapan Mine, was purchased by the Deno Gold Mining Co. of Switzerland in 2002 (MBendi Information Services (Pty) Ltd., undated). The country's copper smelter at Alavderdi was owned by the CJSC Armenian Copper Program (ACP). A Liechtenstein-registered firm, Valex F.M. Establishment, owned 81% of ACP and a Russian businessman owned the remaining 19% (Interfax Russia & CIS Metals and Mining Weekly, 2007b). AMP, which produced ferromolybdenum, molybdenum metal, and rhenium salts, was 51% owned by Cronimet Mining GmbH of Germany; and the remaining shares were owned by Armenian residents (Interfax Russia & CIS Metals and Mining Weekly, 2008b). Table 2 is a list of major mineral industry facilities.

Commodity Review

Metals

Aluminum.—The Kanaker aluminum foil rolling mill in Armenia was one of the leading production facilities in Armenia and was the only producer of aluminum foil in the Caucasus and Central Asia regions. Kanaker, together with two Russian foil mills—Sayanal in the Republic of Khakasiya and Urals Foil—formed RUSAL's Packaging Division. Kanaker employed more than 600 people (RUSAL, 2007).

In December 2005, after renovations were completed, RUSAL launched production at the Kanaker foil mill. The revamping ensured that the Kanaker mill would have the capacity to produce 18,000 metric tons per year (t/yr) of thin foil and 7,000 t/yr of household foil. Kanaker was to produce only for export, and 97% percent of its exports would be destined for Europe (ArmeniaDiaspora.com, 2008).

Copper and Molybdenum.—Armenia's leading producers of copper and molybdenum concentrates were the Zangezur copper-molybdenum complex followed by the Agarak copper-molybdenum complex. Copper mining that did not include molybdenum took place at the Kapan copper complex.

In 2007, ACP reduced blister copper production to 6,954 t, or by 21% compared with output in 2006, because ACP switched from purchasing copper concentrate from the Zangezur copper-molybdenum complex that had a 26% to 28% copper content to purchasing concentrate with a 14% to 15% copper content from its affiliate CJSC Base Metals. CJSC operated the Drombon copper-gold mine in Nagorno-Kararbakh, a predominately ethnic Armenian enclave in Azerbaijan that had been the subject of warfare and dispute concerning its status between Armenia and Azerbaijan (Interfax Russia & CIS Metals and Mining Weekly, 2007a, 2008a).

Plans called for ACP to develop the Tekhut copper-molybdenum deposit, which was the second largest deposit in Armenia after the Kadzharan copper-molybdenum deposit. Preliminary estimates put Tekhut's ore reserves at 450 Mt of ore containing 1.6 Mt of copper and 800,000 t of molybdenum. ACP planned to mine between 25,000 and 30,000 t/yr of copper and 800 t/yr of molybdenum from this deposit (Interfax Russia & CIS Metals and Mining Weekly, 2007c).

ACP exported all the copper it produced; 90% of the copper was sent to Germany and the remainder went to other European countries. In 2007, ACP exported 7,238 t of blister copper compared with 8,696 t in 2006. ACP exported more copper than it produced in 2007 because ACP had maintained stockpiles of copper (Interfax Russia & CIS Metals and Mining Weekly, 2008a).

The Zangezur copper-molybdenum complex processed 10.4 Mt of ore in 2006 and planned to process the same amount in 2007. The introduction of new capacity would result in Zangezur being able to increase ore processing in 2008 to 15 million metric tons per year (Mt/yr). Projections called for ore processing at Zangezur eventually to increase to between 17 and 18 Mt/yr (Interfax Russia & CIS Metals and Mining Weekly, 2007c).

Ferromolybdenum was produced by AMP and the Yerevan Pure Iron Works. AMP was established in 2003 and began steady operation in 2004. It had the capacity to produce 3,600 t/yr of ferromolybdenum. In 2007, AMP reportedly produced 2,854.4 t of ferromolybdenum, which was a 10.2% increase compared with output in 2006. Its main supplier was the Zangezur copper-molybdenum complex, but it also used imported ores from such countries as Chile, China, Peru, and Russia (Interfax Russia & CIS Metals and Mining Weekly, 2007d; 2008b; Armenian Molybdenum Production LLC, 2008).

Outlook

Armenia is positioned to increase its production of copper and molybdenum. Work was being planned to increase production of these metals by increasing extraction of copper and molybdenum ore and by increasing the degree of metal processing to export semifinished metal products instead of raw materials. Armenia would increase its energy supply when the country begins receiving natural gas from Iran through a pipeline that is under construction. The pipeline is being built in two stages; the first stage is scheduled for completion in 2007 and would supply Armenia with 450 million cubic meters per year. Upon expansion to full capacity, Iran would supply Armenia with 2.8 billion cubic meters per year through the pipeline (Interfax Russia & CIS Oil and Gas Weekly, 2007).

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TABLE 1

ARMENIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
METALS						
Aluminum, foil		9,317	6,193	--	945 [r]	12,256
Copper:						
Concentrate, Cu content		18,068	17,700 [e]	16,256	18,000 [r]	17,600 [e]
Blister, smelter, primary		6,259 [r]	9,470 [r]	9,881	8,791	6,954
Ferroalloys:						
Ferromolybdenum		1,674 [r]	2,709 [r]	5,566 [r]	4,865 [r]	5,977
Ferrotungsten		NA	NA	8	42	45
Gold, mine output, Au content	kilograms	1,800	2,100	1,400	1,400	1,400 [e]
Molybdenum:						
Concentrate, Mo content		2,763	2,950 [e]	3,030	4,088 [r]	4,295
Metal		NA	NA	270	487	500
Rhenium[e]	kilograms	1,000	1,000	1,200	1,200 [r]	1,200
Silver[e]	do.	4,000	4,000	4,000	4,000	4,000
Zinc, concentrate, Zn content		2,056	1,927	3,196	4,454 [r]	4,924
INDUSTRIAL MINERALS						
Barite		240	561	590	600	600
Caustic soda		1,800	2,800	6,200	4,166 [r]	5,484
Cement	thousand metric tons	384	501	605	625	722
Clays:						
Bentonite		55,000	40,000	38,000	37,000	40,000
Bentonite, powder		642 [e]	561 [r]	732	720	1,129
Diamond, cut	thousand carats	400	263	222	184	123
Diatomite		230	200	190	180	200
Gypsum		57,835 [r]	51,400 [r]	44,200	43,700 [r]	54,600
Limestone	thousand metric tons	13,000	16,000 [e]	17,000	17,000 [e]	18,000
Perlite		106,623 [r]	29,996 [r]	49,963 [r]	35,000 [e]	35,000 [e]
Salt		31,854 [r]	31,625 [r]	34,682 [r]	37,000	34,800
MINERAL FUELS AND RELATED MATERIALS						
Natural gas, dry	million cubic meters	NA	NA	NA	1,596	2,285

[e]Estimated; estimated data are rounded to no more than three significant digits. [r]Revised. do. Ditto. NA Not available. -- Zero.

[1]Table includes data available through September 30, 2009.

TABLE 2

ARMENIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Aluminum, rolled and foil	ARMENAL (formerly Kanaker aluminum plant) (United Company RUSAL)	K'anak'err	25,000
Copper:			
Mine output, Cu content	Facilities in operation:		30,000 [3]
	Agarak copper-molybdenum mining and processing complex [Comsup Commodities, Inc. (United States)]	Agarak	
	Kapan mining complex [Deno Gold Mining Company (Switzerland)]	Kapan	
	Zangezur copper-molybdenum complex [Cronimet Mining GmbH (Germany), 60%; OJSC Yerevan Pure Iron Works, 15%; Armenian Molybdenum Production LLC (AMP), 12.5%; LLC Zangezur Mining, 12.5%]	Kadzharan	
	Facilities apparently not in operation:		
	Akht'ala mining complex	Akht'ala	
	Shamlugh mining complex	Shamlugh	
Blister	CJSC Armenian Copper Programme (ACP) (Valex F.M. Establishment, 81%, and Russian businessman, 19%)	Alaverdi	15,000
Diamond, cut stones	Aghavni diamond-cutting works[4]	Nor Geghi	NA
Do.	Amma group diamond-cutting works[4]	Artashat	NA
Do.	Andranik-Dashk diamond-cutting works	Nor Hachyn	NA
Do.	Arevakn diamond producing plant	do.	NA
Do.	Diamond Company of Armenia (DCA)	Yerevan	NA
Do.	Diamond Tech	Talin	NA
Do.	Lori diamond-cutting works	Nor Hachyn	NA
Do.	Lusampor[4]	Melik'gyugh	NA
Do.	Punji diamond-cutting works[4]	Yerevan	NA
Do.	Sapphire diamond-cutting works	Nor Hachyn	NA
Do. thousand carats	Shoghakan gem-cutting plant	do.	120
Gold kilograms	Zod mining complex	Zod	2,000
Do.	Megradzor deposit	Megradzor	NA
Do.	Lichkvazkoye, Shaumyanskiy Rayon, Sotkskoye, and Terterasarskoye deposits	NA	NA
Iron ore	Hrazdan deposit	Sulagyan Mountains	NA
Molybdenum:			
Mine output, Mo content	Agarak copper-molybdenum mining and processing complex [Comsup Commodities, Inc. (United States)]	Agarak	2,000
Do.	Zangezur copper-molybdenum complex [Cronimet Mining GmbH (Germany), 60%; OJSC Yerevan Pure Iron Works, 15%; Armenian Molybdenum Production LLC (AMP), 12.5%; LLC Zangezur Mining, 12.5%]	Kadzharan	20,400
Metal, ferromolybdenum	Armenian Molybdenum Production LLC (AMP) [Cronimet Mining GmbH (Germany), 51%; Armenian residents, 49%]	NA	3,600
Do.	OJSC Yerevan Pure Iron Works	Yerevan	NA
Perlite thousand metric tons	Aragats-Perlite mining-beneficiation complex	Aragats deposit	1,110
Zinc, mine output, Zn content	Kapan mining complex [Deno Gold Mining Co. (Switzerland)]	Kapan	NA

See footnotes at end of table.

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[e] Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

[1] Table includes data available through September 30, 2009.

[2] Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

[3] Capacity estimates are totals for all enterprises that produce that commodity.

[4] Current existence of enterprise cannot be confirmed.

THE MINERAL INDUSTRY OF AUSTRIA

By Harold R. Newman

Although Austria has diverse mineral resources for a small country and although the mining industry has had a long tradition there, metal mining activity had declined during the past few years owing principally to environmental issues, high mining costs, low ore grades and reserves, and increased foreign competition. All metal mines except the open pit iron ore operation at Erzberg and the underground tungsten operation at Mittersill were closed by 2007. This was not the case with the industrial minerals sector, however, which produced a number of minerals, including dolomite, gypsum, lime, limestone, and marble. Austria produced about 4% of the world's production of magnesite, about 1.5% of the world's production of tungsten, and about 1% of the world's production of natural gypsum (Crangle, 2009; Kramer, 2009; Shedd, 2009). Mineral resources occur throughout the country, and the State of Styria in particular was considered to have large deposits of minerals.

Production

In 2007, Austria produced secondary aluminum and secondary copper, along with ferroalloys, iron ore, steel, and tungsten. Austria was also a producer of magnesite, salt, and talc and had ample supplies of dolomite and limestone to support a viable cement industry. Most mineral industry growth was in the industrial minerals sector where operations had been developed by the private sector. Data on Austria's mineral production are in table 1.

Structure of the Mineral Industry

Although most of the Austrian mineral industry was privately owned, a portion of the industry was still under Government control. Österreichische Industrieholding AG (ÖIAG) was the investment and privatization agency of the Government. Table 2 is a list of major mineral industry facilities.

Commodity Review

Metals

Copper.—Montanwerke Brixlegg AG, which was the only copper producer in Austria, specialized in the recycling of copper and other valuable materials to extract pure metals, oxides, and salts from such materials as alloys, blasting grit, residues, and scrap metals using a refining process. Montanwerke Brixlegg processed about 130,000 metric tons per year of secondary material containing copper. Production of secondary copper increased significantly to 81,000 metric tons (t) in 2007 from 72,600 t in 2006. Montanwerke exported about 80% of its products (Montanwerke Brixlegg AG, 2007).

Iron and Steel.—Treibacher Industrie AG had been producing noble ferroalloys for more than 80 years and was a market leader for such ferroalloys as ferromolybdenum and ferrovanadium. Other ferroalloys produced by Treibacher included ferrochrome, ferronickel, and ferrotungsten. The elements contained in these alloys give alloyed steels specific properties, such as acid resistance, cold toughness, heat resistance, and hardness (Treibacher Industrie AG, 2007).

Voest-Alpine Stahl AG was an international producer and distributor of steel and steel products. The company's activities were carried out through four divisions: automotive, crude steel, profilform, and railway systems. Voest-Alpine had sales of about $14.7 billion in 2007. Eighty-eight percent of these sales was to the export market. Voest-Alpine was the leading producer in Europe of specialty steel, such as tool steel, and steel strip, steel rails, and high-quality wire (Voest-Alpine Stahl AG, 2007).

Iron Ore.—Voest-Alpine Erzberg GmbH mined about 2 million metric tons per year (Mt/yr) of iron ore with a content of 32% iron and 2% manganese by open pit mining from the Erzberg Mine, which was the largest iron ore open pit mine in central Europe. The main ore minerals were ankerite, ferrous dolomite, and siderite, which provided the basis for a variety of products. Iron ore was converted by reduction in the blast furnace to hot metal, a product that serves as the basis for the steelmaking process. The Erzberg Mine Rewritten supplied 25% of the iron ore required in the steelmaking process of Voest-Alpine Erzberg. The rest of the iron ore requirement was imported, mainly from Brazil and South Africa (Voest-Alpine Erzberg GmbH, 2007).

Tungsten.—Wolfram Bergbau und Hütten GmbH (WBH) operated one of the Western World's leading tungsten mines at Mittersill and a tungsten conversion plant at Bergla. The production line started at the mine in Mittersill where scheelite (calcium tungstate) was extracted in an underground mining operation. The crude ore was transported to the ore-dressing plant at Bergla. At the ore-dressing plant, the crude ore was converted into a scheelite concentrate using a flotation process. WBH specialized in the production of pure and extremely fine-grained tungsten oxide, tungsten metal, and tungsten carbide powders for the powder metallurgy industry (Wolfram Bergbau und Hütten GmbH, 2007).

Industrial Minerals

Cement.—Lafarge Perlmooser AG, which was a subsidiary of the Lafarge Group of France, was Austria's leading manufacturer of cement. Lafarge Perlmooser had cement plants located in Mannesdorf and Retsnei and a grinding plant located in Kirchbichl. The operations produced about 2.2 Mt/yr of cement. After the activation of its first substitute fuels project, Lafarge Perlmooser was continuing with its substitute fuels program. The first project was a solvent plant that cost about $1.9 million. Lafarge Perlmooser believed that solvent could replace such fossil energy sources as coal or oil and could be an important contributor to a cost-effective fuel supply in the future (Lafarge Perlmooser AG, 2007).

Talc.—Luzenac Naintsch AG, which was the only producer of talc in Austria, announced that it would sell two of its production sites in Lassing, Upper Styria, and Ennsdorf, Upper Austria, because the production sites would no longer fit in with the company's core business. Naintsch stated that a number of companies, including major Austrian and international companies, had expressed interest in the mine at Lassing. Underground mining at Lassing had ceased after 10 miners were killed in a shaft collapse in 1998. The Lassing plant continued processing abrasive raw materials, such as calcite, carbonate, dolomité, and marble (Global Minerals Magazine, 2007).

Mineral Fuels

Natural Gas and Petroleum.—Österreichische Aktiengesellschaft (OMV) was Austria's leading industrial company in the area of mineral fuels. It explored for natural gas and petroleum and imported, transported, and stored natural gas.

OMV and Gazprom of Russia signed a memorandum of understanding on further cooperation in the natural gas business. The two companies stated their interest in working more closely on the Central European Gas Hub at Baumgarten, which was owned by OMV Gas International) (a subsidiary of OMV). The Baumgarten hub was one of the most important in Europe and handled 1.3 billion cubic meters per month of natural gas. That volume was to be increased in the future. About one-third of all Russian natural gas exports to Western Europe passed through the hub at Baumgarten. Gazprom was the world's leading gas company and had 17% of the world's explored natural gas reserves (Dempsey, 2007).

OMV announced that it would invest about $165 million by 2009 in the reconstruction and development of the production infrastructure in the Vienna Basin as part of the "Matzen Neu" modernization project and the "Ebenthal Tief" field development project. The Matzen Neu project involved the modernization of the oilfield infrastructure and included the construction of a new central production facility to replace the 12 existing stations, which would be changed into gaging stations. The Ebenthal Tief gasfield project involved the construction of a 16-kilometer-long pipeline to a compressor station at Auersthal. The modernization of the infrastructure in the Vienna Basin and the development of the Ebenthal Tief gasfield were part of OMV's strategy to increase domestic production by 25% by 2010 (Rigzone.com, 2007).

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TABLE 1
AUSTRIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
METALS						
Aluminum, metal, secondary[e]	metric tons	155,000	160,000	151,200	150,000	152,000
Copper, refined, secondary	do.	65,084	74,245	72,316	72,600[2]	81,000
Gold, metal[e]	kilograms	25	15	15	15	--
Iron and steel:						
Iron ore and concentrate:						
Gross weight		2,119	1,882	2,048	2,091[r]	2,153[2]
Fe content		678	602	655[e]	650[e]	688
Metal:						
Pig iron		4,677	4,847	5,444	5,547[r]	5,907[2]
Ferroalloys, electric arc furnace[e]		5	6	6	6	6
Crude steel		6,261	6,530[e]	7,031	6,487[r]	6,871[2]
Semimanufactures[e]		5,300	5,400	5,500	5,500	5,600
Lead, refined, secondary[e]	metric tons	18,000	24,000	22,000[2]	22,000	22,000
Manganese, Mn content of domestic iron ore[e]	do.	16,000	16,000	16,000	16,000	15,000
Tungsten, mine output, W content of concentrate	do.	1,332	1,400[e]	473[r]	400[r]	435[2]
INDUSTRIAL MINERALS						
Cement, hydraulic		3,886	3,976	4,736[r]	4,700[e]	4,600
Clays:						
Illite		1,708	2,013	2,000[e]	2,000[e]	2,000
Kaolin, crude		100	105[r]	56	52[r]	57[2]
Other[e]		2,600	2,600	2,500	2,500	2,500
Gypsum and anhydrite, crude		1,004	1,039	1,113	936[r]	1,006[2]
Lime[e]		2,000	2,000	1,000	1,000	1,000
Magnesite:						
Crude		767	715	694	769[r]	812[2]
Sintered or dead-burned		200[e]	267	304	250[r]	202[2]
Caustic calcined[e]		165	161	98	100	100
Nitrogen, N content of ammonia[e]		400	440	400	400	400
Pigments, mineral, micaceous iron oxide[e]	metric tons	5,000	5,000	5,000	5,000	5,000
Pumice (trass)	do.	2,865	2,900	2,943	3,000[e]	3,000
Salt (rock and brine), NaCl content	do.	1,028,273	1,030,234	1,024,040	1,030,000[e]	1,025,000[2]
Sand and gravel:						
Quartz sand		944	864	1,704	2,008[r]	1,840[2]
Other sand and gravel		6,079	5,886	6,000	6,000	6,000
Total		7,023	6,750	7,704	8,008[r]	7,840
Sodium compounds, manufactured, n.e.s.[e, 3]						
Soda ash		150	150	100	100	100
Sulfate		100	100	100	100	100
Stone:[4]						
Dolomite		5,468	5,907	6,291	6,331[r]	6,620[2]
Quartz and quartzite		283	294	249	290[r]	306[2]
Other:						
Limestone and marble		24,477	24,158	22,644[r]	28,818[r]	28,000
Basalt		4,669	5,197	3,166	3,200	3,200
Marl		1,069	1,747	1,479	1,500	1,500
Crushed stone[e]		12,000	5,858[2]	4,917[2]	5,000	5,000
Total		42,215	36,960	32,206[r]	38,518[r]	37,700
Grand total		47,966	43,161	38,746[r]	45,139[r]	44,600
Sulfur, byproduct of petroleum and natural gas	metric tons	10,400	10,705	8,458	9,000	8,500
Talc and soapstone, crude	do.	137,596	136,305	166,569	159,447[r]	153,409[2]

See footnotes at end of table.

TABLE 1—Continued

AUSTRIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
MINERAL FUELS AND RELATED MATERIALS						
Coal, brown and lignite		1,152	235	6	5	5
Coke		1,400 [e]	1,414	1,400 [e]	1,400	1,400
Natural gas:						
Gross	million cubic meters	2,030	2,011	1,654	1,765 [r]	1,660 [2]
Marketed[e]	do.	1,200	1,200	1,200	1,700 [r]	1,600
Oil shale	metric tons	432	248	--	--	--
Petroleum:						
Crude	thousand 42-gallon barrels	6,976	6,728	6,413	7,084 [r]	7,082 [2]
Refinery products:						
Liquefied petroleum gas	do.	580	661	1,241	587 [r]	813 [2]
Gasoline	do.	15,394	14,773	15,283	13,719 [r]	14,467 [2]
Kerosene and jet fuel	do.	3,576	3,534	4,596	4,084 [r]	4,688 [2]
Distillate fuel oil	do.	26,987	27,000	27,000	6,828 [r]	6,555 [2]
Residual fuel oil	do.	7,009	6,061	6,141	6,687 [r]	4,052 [2]
Unspecified	do.	29,169	33,075	31,654	31,787 [r]	34,454 [2]
Refinery fuel and losses	do.	4,739	5,068	4,627	2,427 [r]	3,537 [2]
Total	do.	87,454	90,172 [r]	90,542	66,119 [r]	68,566 [2]

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through January 31, 2009.

[2] Reported figure.

[3] Not elsewhere specified.

[4] Excludes stone used by the cement and iron and steel industries.

TABLE 2
AUSTRIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina, fused	Treibacher Schleifmittel AG	Plant at Villach	100.
Aluminum	Aluminum Lend GmbH (Salzburger Aluminium AG, 100%)	Secondary ingot plant at Lend	25.
Do.	AMAG Casting GmbH (Amag Austria Metall, 100%)	Secondary ingot plant at Ranshofen	50.
Cement	Lafarge Perlmooser AG (Lafarge Group, 100%)	Plants at Mannesdorf and Retsnei; grinding plant at Kirchbichl	2,200.
Do.	Wietersdorfer & Peggauer Zementwerke GmbH	Plants at Peggau and Wietersdorf	1,000.
Do.	Zementwerk Leube GmbH	Plant at Gartenau	700.
Do.	SPZ Zementwerke Eiberg GmbH	Plant at Eiberg	600.
Do.	Gmundner Zement	Plant at Gmundner	580.
Coal	Graz-Koflacher Eisenbahn und Bergbaugesellschaft GmbH (Government, 100%)	Oberdorf Mine, Barnbach (closed)	1,200.
Copper, secondary	Montanwerke Brixlegg AG (A-Tec Industries, 91.6%)	Plant at Brixlegg	75 cathode, 66 billet.
Ferroalloys, FeV, FeMo, FeNi	Treibacher Industries AG	Plants at Althofen and Treibach	10.
Graphite	Industrie und Bergbaugesellschaft Pryssok & Co KG	Trandorf Mine at Mühldorf	15.
Do.	Grafitbergbau Kaiserberg AG	Kaisersberg Mine	3.
Do.	do.	Trieben Mine	3.
Gypsum	Erste Salzburger Gipswerk-Gesellschaft Christian Moldan KG	Abtenau and Moosegg Mines	300.
Do.	Rigips Austria GmbH	Grundlsee, Puchberg, Unterkainisch, and Weisenbach Mines	250.
Do.	Knauf Gesellschaft GmbH	Hinterstein Mine	160.
Iron ore	Voest-Alpine Erzberg GmbH	Erzberg Mine at Eisenerz	3,000.
Lead	Bleiberg Bergwerks-Union AG (Metall Gesellschaft, 74%)	Smelter at Brixlegg	55.
Magnesite	Veitsch-Radex GmbH (RHI AG, 100%)	Mines at Breitenau, Hochfilzen, Radenthein, Trieben, and Veitsch	800.
Natural gas million cubic meters	Osterreichische Aktiengesellschaft (OMV) (Government, 100%)	Fields in Vienna Basin	1,500.
Nitrogen, N content of ammonia	Agrolinz AG	Plant at Linz	498.
Salt	Österreichische Salinen GmbH (Invest Holding GmbH, 100%)	Mines at Bad Ischl	800.
Steel, crude	Voest-Alpine Stahl AG	Plants at Donawitz and Linz	8,500.
Talc	Luzenac Naintsch AG	Mines at Lassing, Rabenwald, and Weisskirchen; plants at Oberfeistitz and Weisskirchen	160.
Tungsten, W content	Wolfram Bergbau und Hütten GmbH	Mittersill Mine, Felbertal, Salzburg; conversion plant, Bergla	350.

THE MINERAL INDUSTRY OF AZERBAIJAN

By Richard M. Levine and Glenn J. Wallace

Azerbaijan produced a range of metals and industrial minerals, which included alumina, aluminum, iron ore, and steel. Its major importance as a world mineral producer, however, was based on its oil industry. The country had been a significant crude oil producer for more than a century but the focus since independence in 1991 was on developing offshore resources in the Caspian Sea. In 2007, oilfield and gasfield development were concentrated in two projects: the Azeri-Chirag-Guneshli (ACG) offshore oilfields and the Shah Deniz offshore gas condensate field (State Oil Company of the Republic of Azerbaijan, 2008).

Minerals in the National Economy

In 2007, the gross domestic product (GDP) in Azerbaijan increased by an estimated 25% compared with that of 2006, with GDP growing in the nonoil sector by 11%. From January through November 2007, the country's foreign trade turnover increased by 2% compared with the same period in 2006; the value of exports decreased by 2.9%, and that of imports increased by 8.1%. Crude oil composed 53.69% of the total value of exports; petroleum refinery products, 26.95%; aluminum products, 1.44%; and ferrous metals and products, 1.21% (Interfax Russia & CIS Statistics Weekly, 2008; U.S. Central Intelligence Agency, 2009).

Production

In 2007, industrial production increased by 24% compared with that of 2006; production of natural gas and crude oil increased by 78% and 36%, respectively. Production in the oil refining sector increased by 7.3%. In the metals sector, Azerbaijan was a small producer of metal products, but in 2007, significant percentage increases were recorded for some products. Aluminum production increased by 23% compared with that of 2006 and iron ore production increased by 56%, but alumina production decreased by almost 50%. A sharp increase was recorded for crude steel output, but this increase seemed to put steel output more in line with recent historic trends than to represent a new higher level of output. In the industrial minerals sector, the results were mixed; output of bentonite, cement, and sulfuric acid increased but output of caustic soda, gypsum, limestone, salt, and construction sand decreased. Data on mineral production are in table 1.

Structure of the Mineral Industry

The State Oil Company of the Republic of Azerbaijan (SOCAR) is a Government-owned entity that is responsible for all aspects of exploration and development of onshore and offshore oilfields and gasfields in Azerbaijan. SOCAR employed 70,000 people. Since 1994, SOCAR had signed 25 major production-sharing agreements (PSAs) with consortiums of foreign oil companies, as well as two major pipeline agreements with international consortia for the Baku-Tbilisi-Ceyhan (BTC) oil pipeline and the Baku-Tblisi-Ezurum (BTE), or Southern Caucasus, pipeline (Azerbaijan International, 2009).

The Azerbaijan International Oil Consortium (AIOC), which was developing the ACG offshore oilfields, consisted of SOCAR; Inpex Corp. and Itochu Corp. of Japan; Statoil ASA of Norway; Turkiye Petrollirti Anonim Ortaklig (TPAO) of Turkey; BP p.l.c. of the United Kingdom; Chevron Corp., Devon Energy Corp., and Exxon Mobil Corp. of the United States; and Delta/Hess, a joint of venture between Delta Oil of Saudi Arabia Co. and Amerada Hess Corp. of the United States. The international consortium developing the Shah Deniz gas condensate field consisted of BP, LukAgip [a joint venture of OAO LUKOIL Co. of Russia and Agip (a subsidiary of Eni S.p.A. of Italy)], National Iranian Oil Co. (NICO), SOCAR, Statoil, Total S.A. of France, and TPAO (EIA).

The country's aluminum industry was controlled by the Open Joint Stock Company (OJSC) Azerbaijan Aluminium (Azeraluminium, or Azeral) concern, which is composed of the Sumgait aluminum smelter, the Gyandzha alumina refinery, and Zaglik alunite mine.

Commodity review

Metals

Aluminum.—Azeral planned to increase aluminum production to 60,000 metric tons per year (t/yr) by 2009. Output at the Sumgait smelter was to increase with the addition of two new pot lines in 2007. Also, a new smelter with a capacity of 100,000 t/yr was to be built in Ganca, which would raise Azeral's total capacity to 160,000 t/yr of aluminum. First output from the new smelter was projected for 2009 (Interfax Russia & CIS Metals and Mining Weekly, 2007a). The terms of a tender awarded to a Dutch firm for the management of Azeral called for investment of $600 million during a 5-year period to increase output to 250,000 t/yr of aluminum, 90% of which was to be exported (Babe-Zade and others, 2007).

In 2007, Azerbaijan produced 185,000 metric tons (t) of alumina, which was about one-half the amount that it had produced in 2006 and well below the peak amount of 400,000 t/yr that it had produced in Soviet times. Alumina was sent to Sumgait for smelting, and the remainder was exported to Tajikistan. When the new Ganca smelter begins operating, the majority of the alumina would be consumed domestically to produce aluminum (Interfax Russia & CIS Metals and Mining Weekly, 2007b).

Iron Ore.—Iron ore was extracted from the Dashkesan skarn-magnetite deposit in the central part of the county. Dashkesan reportedly had 300 million metric tons (Mt) of reserves with an iron content of between 45% and 60% assessed according to the Soviet reserve classification system. The ore also contained up to 0.04% cobalt and vanadium, which presented the possibility of recovering these elements in the ore or from waste. A separate cobalt deposit located in the northern part of the Dashkesan deposit had been mined in the past.

On December 30, 2006, an agreement was signed between the Government of Azerbaijan and a number of foreign companies to explore and develop the Chovda, the Dagkeseme, the Geida, and the Karabakh iron ore deposits and the Kokhnemden field and the Kurekchai Basin. Exploration was to be conducted within 48 months, although this could be extended for an additional 16 months, if needed (Interfax Russia & CIS Metals and Mining Weekly, 2007a).

Industrial Minerals

Iodine and Bromine.—Azerbaijan was producing iodine and bromine from brines at the Baku and the Novoneftechala iodine and bromine plants. The two plants produced 440 t/yr and 800 t/yr of iodine, respectively, and 4,600 t/yr and 3,000 t/yr of bromine, respectively. These brines also contained commercial quantities of strontium, which were not being extracted (Baba-Zade and others, 2007).

Mineral Fuels

Natural Gas.—In 2007, Azerbaijan produced about 10.8 billion cubic meters of natural gas, which was a 78% increase compared with that of 2006. The increase in gas production resulted from the commissioning of production at the Shah Deniz field and increased associated gas production by AIOC and SOCAR. About 60% of natural gas output was produced by Azneft (a state-owned oil company that was a subsidiary of SOCAR). The remainder was produced by joint ventures, the largest of which, in terms of output, was AIOC (U.S. Energy Information Administration, 2007b).

Azerbaijan's major natural gas production increases were expected to come from the development of the Shah Deniz offshore natural gas and condensate field; this field was estimated by industry analysts to be one of the world's largest natural gas fields discovered in the past 20 years. Shah Deniz is located offshore approximately 95 kilometers (km) (60 miles) southeast of Baku (U.S. Energy Information Administration, 2007b).

Development of the eastern part of the Shah Deniz deposit started in December 2006. By June 2008, four wells were in operation and had an average daily output of 19 million cubic meters of gas and 4,500 t of condensate. The fifth development well was under construction. From the start of production at Shah Deniz to June 2008, 5.9 billion cubic meters of gas and 1.6 Mt of condensate was produced. Gas extraction from Shah Deniz was projected to increase to 22 billion cubic meters by 2015. If large-scale development of Shah Deniz were undertaken, production could increase to 35 billion cubic meters per year (State Oil Company of Azerbaijan, 2008).

In Azerbaijan, with the further development of ACG and Shah Deniz and the possibility of opening new gas-condensate deposits in the Azerbaijan sector of the Caspian Sea, the volume of gas production was expected to increase to 21 billion cubic meters in 2010 and to 36 billion cubic meters in 2015 (State Oil Company of the Republic of Azerbaijan, 2008). With the development of Shah Deniz, Azerbaijan was expected eventually to become a net natural gas exporter. Gas purchases from Russia were officially suspended in early 2007 when Shah Deniz started producing. Azerbaijan's natural gas exports were mainly transported through the BTE pipeline, which is 715 km in length and 1,066 millimeters (mm) (42 inches) in diameter. It runs parallel to the BTC pipeline for most of its route before connecting to the Turkish gas pipeline network near the town of Horasan. The pipeline had the capacity to transport 233 billion cubic feet (about 6.6 billion cubic meters) per year, which could be increased eventually to 700 billion cubic feet (almost 20 billion cubic meters) per year (U.S. Energy Information Administration, 2007b; State Oil Company of Azerbaijan, 2008).

Petroleum.—In 2007, crude oil production in Azerbaijan reached 42.5 Mt, which was a 36% increase compared with production in 2006. Since 1997, most of the increase in Azerbaijan's oil production had come from AIOC's operations at the ACG fields. Extraction at AGC was carried out from platforms established in the Chirag area; in the central, eastern and western parts of the Azeri deposit; and from the deepwater part of the Guneshli deposit. In the AGC fields, 46 wells were in operation. Daily extraction was more than 800,000 barrels (110,000 t) of oil. The ACG group of oilfields produced more than 65% of the country's oil, and this share was expected to increase (State Oil Company of the Republic of Azerbaijan, 2008).

AIOC also has contributed more than 70% of Azerbaijan's total crude oil exports (U.S. Energy Information Administration, 2007c). Implementation of the program for full-scale development of the ACG deposits and also the possibility of developing other new oil and gas condensate offshore deposits enabled SOCAR to predict substantial growth in oil production to between 66 and 67 million metric tons per year (Mt/yr) in 2015. According to industry journals, estimates of Azerbaijan's proven crude oil reserves range between 7 and 13 billion barrels (about 950 Mt to 1.77 billion metric tons [Gt]). SOCAR reportedly estimated proven oil reserves to be 925 Mt of oil (State Oil Company of the Republic of Azerbaijan, 2008).

In addition to the existing Northern "Baku-Novorossiysk" pipeline, which was built in 1997, and the "Baku–Supsa" pipeline (also called the Western Early Oil Route), which was constructed in 1999, the BTC pipeline was commissioned in May 2006 to deliver Azerbaijan's oil to Europe and to the world markets. The BTC pipeline is 1,769 km in length and the throughput is 1 million barrels per day of oil, or 50 Mt/yr. In 2006, AIOC announced that it would supply only 60% of the oil for the pipeline, which opened the way for Kazakhstan to ship oil through the BTC (U.S. Energy Information Administration, 2007c). In addition to new pipeline capacity, SOCAR invested $350 million to construct the Kulevi oil terminal in Georgia, which, when finished, would be able to accept two tankers simultaneously (State Oil Company of the Republic of Azerbaijan, 2008).

Crude oil was refined domestically at two refineries: the Azernefteyag (Baku) refinery, which had a capacity of 242,000 barrels per day (bbl/d), and the Heydar Aliev (formerly Azernefteyagandzhah) refinery, which had a capacity of

200,000 bbl/d. Refinery utilization rates were as low as 40%. Both refineries were in need of modernization and pollution control equipment (U.S. Energy Information Administration, 2007c).

Outlook

The achievement of capacity flow through the BTC pipeline is expected to enable oil production from the ACG project to increase (U.S. Energy Information Administration, 2007a). The development of the Shah Deniz offshore gasfield, in conjunction with the completion of construction of the BTE pipeline, is expected to enable Azerbaijan to significantly increase natural gas production and begin exporting gas. Developments in the hydrocarbon production sector could spur development in the metals mining and metallurgical sector owing to increasing demand for metallic components and machinery needed by the fuel sector (Baba-Zade and others, 2007).

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TABLE 1
AZERBAIJAN: PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity	2003	2004	2005	2006	2007
METALS					
Alumina	180,000	232,000	315,000	362,700	184,500
Aluminum, primary and secondary	18,565	29,537	31,762	31,852	39,241
Iron ore, marketable:					
Gross weight	3,100	19,100	7,300	11,300	17,600
Fe content[e]	1,800	9,550 [r]	3,650	5,650	8,800
Steel:					
Crude	56,354	90,410	286,117	54,309	273,393
Pipes	5,400	84	1,257	14,108	25,706
INDUSTRIAL MINERALS					
Bentonite	NA	NA	53,700	40,644 [r]	50,459
Bromine[e]	3,500 [r]	3,500 [r]	3,500 [r]	2,000	2,000
Caustic soda	21,600	24,700	30,000	30,509 [r]	18,013
Cement	1,012,700	1,427,500	1,537,900	1,622,000	1,730,800
Gypsum	3,848	8,840	28,242	35,034	22,037
Iodine	349	400 [r]	500 [r]	600 [r]	600
Limestone	762,000	1,273,000	1,256,443	1,416,038	1,413,000
Salt	7,645	9,234	11,202	12,029	7,127
Sand, construction	516,600	684,110	662,410	986,700 [r]	702,100
Sulfuric acid	22,500	26,400	18,800	19,700 [r]	24,800
MINERAL FUELS AND RELATED MATERIALS					
Natural gas thousand cubic meters	5,127,700	4,995,400	5,732,100	6,079,500	10,832,100
Petroleum:					
Crude	15,251,300	15,548,800 [r]	21,993,600	31,186,000 [r]	42,523,200
Refinery products	6,156,400	6,607,200	7,655,900	7,788,800 [r]	8,088,500

[e]Estimated; estimated data are rounded to no more than three significant digits. [r]Revised. NA Not available. -- Zero.

[1] Table includes data available through January 31, 2010.

[2] For some metals, including alunite, arsenic, copper, gold, lead, molybdenum, silver, and zinc, and for a number of industrial minerals that Azerbaijan produced, data were not sufficient to derive production estimates or to determine if production had ceased.

TABLE 2
AZERBAIJAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Locations or deposit names	Annual capacity[e]
Alumina	OJSC Azerbaijan Aluminum [Azeraluminum (Azeral)]:		
	Gyandzha refinery	Ganca	400,000
Aluminum	Sumgait smelter	Sumqayit	60,000
Alunite ore	Zaglik alunite mining directorate	Zaglik, Dashcasan Region	600,000
Arsenic	Bitibulagh enargite deposit	Gedabay	NA
Do.	Daridagh red orpiment-realgar deposit	Julpha	NA
Do.	NA	Dzhul'finskiy Region	NA
Barite	Azad, Bashgishlag, Chaycand, Chovdar, Gusgchu, Tonashen, and Zaylik deposits	Khanlarskiy Region	NA
Bauxite	Permian deposit	Nakhichevan Region	NA
Cement	Plants at Karadagly and Tauz	Karadagly and Tauz Region	2,000,000 [3]
Clays:			
Bentonite	Dash-Salakhlinskoye deposit	do.	100,000
Refractory	Chardakhla deposit	Chardakhla	NA
Construction materials, including:			320,000
Building sawn stone-block	NA	Aidagh, Dash Salahly, Dilagarda, Dovlatyarly, Gozdak, Mardacan, Naftalan, Shahbulag, Zayam deposits	
Facing stone	NA	Dashcasan, Gulably, Gulbacht, Shahtahty deposits	
Copper ore	Karadagskiy complex	Shamkhorskiy Region	30,000
Dolomite	Negram and Kobustan deposits	do.	NA
Gemstones, precious and semiprecious	Agate, chalcedony, and heliotrop deposits	Santon	NA
Do.	Amethyst, garnet, and granite deposits	Gedebey Rayonu	NA
Gypsum	Deposits: Agdjakend deposit Araz deposit Jukhary Aghjacand anhydrite deposit	Locations: Kazakhskiy Region Nakhichevan Region Goranboy Region	40,000 [3]
Iodine and bromine	Baku, Karadagly, and Novaneftechala plants	Process oil well brines at plants in Baku, Karadagly, and Neftechala	NA
Iron ore, marketable	Dashkasan mining directorate	Dashkasan Region	50,000 [3]
Do.	NA	Kokhnemden field, Kurekchai Basin, and Chovda, Dagkeseme, Geida, Karabakh iron ore deposits	NA
Lead-zinc ore	Gumushlu deposit	Ordubadskiy and Norashenskiy Regions	NA
Limestone	Dashkesan deposit	Dashkasan Region	NA
Natural gas, processing	Karadagly plant	Near Baku	NA
Petroleum and natural gas:[4]			
Crude petroleum and gas condensate	Azerbaijan International Oil Consortium (AIOC) in conjunction with BP p.l.c. (United Kingdom), Chevron Corp. (United States), State Oil Company of the Republic of Azerbajan (SOCAR), Inpex Corp. (Japan), Statoil ASA (Norway), Exxon Mobil Corp. (United States), Turkiye Petrollirti Anonim Ortaklig of Turkey (TPAO), Itochu Corp. (Japan), Devon Energy Corp. (United States), and Delta/Hess [joint venture of Delta Oil (Saudi Arabia) and Amerada Hess Corp. (United States)]	Azeri-Chirag-Gunashi (ACG) offshore oilfields in Caspian Sea	NA

See footnotes at end of table.

TABLE 2—Continued

AZERBAIJAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Locations or deposit names	Annual capacity[e]
Petroleum and natural gas—Continued:[4]				
Crude petroleum and gas condensate—Continued		State Oil Company of the Republic of Azerbaijan (SOCAR) in conjunction with international production-sharing agreements	Production from onshore deposits, which includes deposits on the Ashperon Peninsula and in the Izhnekurin Valley	NA
Do.		do.	Production from offshore fields	NA
Do.		do.	Major pipeline agreements: Baku-Baku-Tbilisi-Ceyhan (BTC), Baku-Tbilisi-Ezurum (BTE or South Caucasus)	NA
Natural gas		Azneft [a subsidiary of State Oil Company of the Republic of Azerbaijan (SOCAR)] in conjunction with international production-sharing agreements	Almost all production from offshore fields, including Bakharly field	NA
Do.		International consortium consisting of BP p.l.c. (United Kingdom), Statoil ASA (Norway), State Oil Company of the Republic of Azerbaijan (SOCAR), LukAgip [joint venture of OAO LUKOIL Co. (Russia) and Agip (a subsidiary of Eni S.p.A. of Italy)], National Iranian Oil Co. (NICO), Total S.A. (France), and Turkiye Petrollirti Anonim Ortaklig of Turkey (TPAO)	Shah-Deniz gas condensate field	NA
Petroleum, refined	42-gallon barrels	Azernefteyag (formerly Baku) refinery	Baku	83,950,000 [4]
Do.	do.	Heydar Aliev (formerly Azernefteyagandzhah and Novo-Baku refinery)	do.	77,380,000 [4]
Quartz sands		Miocene-Pliocene deposits	Gobustan, Absheron Peninsula, Guba Region	10,000
Rock salt		Hehram and Pusyan deposits	Nakhichevan Region	2,500,000
Steel:				
Crude		Azerboru JSC	Sumqayit	400,000
Pipe, tubes		Baku Steel Works	Baku	400,000

[e] Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

[1] Table includes data available through September 30, 2009.

[2] Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations. A number of production facilities, which include those for arsenic, bauxite, copper, and lead-zinc, may not be in operation and information is not adequate to determine if production capacity, if any, at these facilities exists.

[3] Capacity estimates are totals for all enterprises that produce that commodity.

[4] Capacity for crude petroleum distillation.

THE MINERAL INDUSTRY OF BELARUS

By Richard M. Levine and Glenn J. Wallace

Belarus has a number of mineral production enterprises, including a ministeel mill, a nitrogen production enterprise, two oil refineries, and a potash mining enterprise. An oil pipeline that passes through Belarus transports about 70 million metric tons per year (Mt/yr) of Russian oil to Europe, and a gas pipeline that passes through Belarus is a significant export route for gas from Russia to Europe.

Minerals in the National Economy

In 2007, the fuel sector accounted for 20.4% of the value of the country's industrial production; the chemical and petrochemical sector, 11.6%; the ferrous metallurgical sector, about 4%; the construction materials sector, 4.6%; the mining sector, 2%; and the nonferrous metallurgical sector, 0.2% (Ministry of Statistics and Analysis of the Republic of Belarus, 2008, p. 340-360). Belarus benefited from high prices for fertilizers and steel, which were its major exports. Belarus had one of the world's most energy-intensive economies and was highly dependent on energy imports. Natural gas, all of which was imported, provided 60% of the country's energy requirements.

In 2007, the category mineral products constituted 35.8% of the total value of exports and the category ferrous, nonferrous metals, and articles thereof accounted for 11.9%. In 2007, Belarus exported 236,400 metric tons (t) of nitrogenous fertilizers, which was a 5.1% increase compared with exports in 2006; 15.0816 million metric tons (Mt) of petroleum products, which was an increase of 1.8%; and 4.354 Mt of potash (K_2O), which was an increase of 9.9%. From January through November, Belarus increased exports of ferrous metals by 2.7% to 1.8915 Mt (Interfax Russia & CIS Statistics Weekly, 2008b). Of the country's major mineral imports, those of crude oil decreased by 4.5% compared with those of 2006 to 20 Mt, and those of natural gas decreased by about 1% to 20.6 billion cubic meters, but imports of ferrous metals increased by 3.4% to 3.2876 Mt. All imports of crude oil and natural gas came from countries of the Commonwealth of Independent States (CIS), as did more than 95% of ferrous metals imports (Ministry of Statistics and Analysis of the Republic of Belarus, 2008, p. 573-580).

Belarus held 34% of the global potash export market in 2006. About 80% of the country's potash production was exported. Exports of potash mineral fertilizers to world markets were conducted by the Closed Joint Stock Company (JSC) Belarus Potash Co., a company founded jointly by Republican unitary enterprise (RUE) Production Amalgamation Belaruskali and Open JSC Uralkali. Production from Belaruskali was exported to more than 50 countries in Africa, East Asia, Europe, India, North America, and South America (Republican unitary enterprise Production Amalgamation Belaruskali, 2007).

Tensions arose between Belarus and Russia in March 2006 when Russia's state gas monopoly, Gazprom, announced that Belarus would be charged European rates for Russian gas beginning in 2007, which would mean that Belarus would pay up to five times as much for gas imports from Russia. Belarus threatened to retaliate by interrupting Russian gas crossing the country on its way to Western Europe, which recalled a similar dispute with Ukraine. At yearend, Belarus and Gazprom signed a contract for gas deliveries just before a delivery deadline was set to expire. Under the contract, Belarus would have to pay more than twice the amount for Russian natural gas in 2007 than it had been charged in 2006, and this rate would increase to European levels by 2011. Gazprom would gain a 50% stake in Belarus' state-owned domestic gas-transport monopoly, Beltranshaz, which controlled Belarus' local gas transmission pipeline network. Gazprom already owned all of Belarus's international transit pipelines through which it shipped about 20% of its European gas exports. The remaining 80% of Russia's gas exports was transported by pipeline across Ukraine (Kupchinsky, 2006; Maksymiuk, 2007; Radio Free Europe/Radio Liberty, 2007).

Although the agreement appeared to settle the dispute that jeopardized gas supplies to Belarus, in August, Russia's Gazprom threatened to cut gas supplies to Belarus by 45% because Belarus was seriously in arrears in paying Gazprom for gas. The dispute was quickly settled when Belarus agreed to pay Gazprom (Belarus News and Analysis, 2007).

In the area of oil transport, Russia supplied 30% of all the European Union's (EU's) oil imports and piped one-half of these shipments through its Druzhba pipeline, which crossed the territory of Belarus. In early January 2007, Russia cut off oil shipments to European markets through the Druzhba pipeline after accusing Belarus of illegally siphoning off oil from the pipeline. The origin of the dispute was a $45-per-metric-ton transit duty that Belarus imposed on Russian oil transported across Belarus, which it made retroactive to January 1, 2007, (which was the day that Russia raised the price of the natural gas that it supplied to Belarus). Until that time, Belarus had charged only a shipping fee for Russian oil transported across its territory. As a way of receiving this fee, Belarus had decided to take oil from the pipeline. In response, Russia cut off oil shipments through the Druzhba pipeline without warning its European customers. Germany, Hungary, Poland, the Czech Republic, and Slovakia were affected. On January 11, after a 3-day halt in supply, Russia resumed shipping crude oil to Europe through Belarus. Belarus agreed to drop the oil transit duty and agreed to return the oil Russia said it had taken illegally (Spiegel Online International, 2007a).

To avoid shipping as much oil through Belarus, the Russian company Transneft proposed to construct an oil pipeline that would bypass Belarus. The proposed pipeline would be capable of transporting 50 Mt/yr of oil and would allow Russia to supply oil to the EU market by routing the fuel directly to the Russian Baltic Port of Primorsk (Spiegel Online International, 2007b).

In addition to the dispute concerning the transit fee on Russian oil shipped through Belarus, in December 2006, the Russian Government imposed a duty of $180.70 per metric ton as of January 2007 on crude oil exported to Belarus because

Russia claimed that it was losing billions of dollars every year by allowing its firms to send duty-free oil to Belarus's two refineries in Mazyr and Navapolatsk, which then reexported value-added products to Europe (Maksymiuk, 2007).

Belarus and Russia had formally resolved their dispute concerning oil export duties on Russian oil exports to Belarus by the end of January. The agreement acknowledged that oil exported from Russia to Belarus is subject to customs export duties. It set the amount of the duties on Russian exports of crude oil at a reduced but increasing scale for 2007 through 2009, beginning at $53 per metric ton. With the imposition of these duties, Belarus would share with Russia a large proportion of the profits that it had been earning previously from refining cheap Russian oil and selling the value-added products to European markets (Netreba and others, 2007; People's Daily, 2007).

Production

In 2007, the gross domestic product (GDP) of Belarus increased by 8.1% in constant prices compared with that of 2006. The value of industrial production in Belarus increased by 8.5% (in constant prices) compared with that of 2006 (Interfax Russia & CIS Statistics Weekly, 2008a). Production increased by 11.3% in the construction materials sector and by 7.9% in the ferrous metallurgy sector, but decreased by 0.2% in the fuel sector. Of the main mineral products produced, Belarus increased production of potash, rolled-steel products, and crude steel by 8%, 7.1%, and 3.9%, respectively. In 2007, the mineral industry operated at almost full capacity—the steel industry operated at 100% of capacity; the mineral fertilizer industry, at 99.7% of capacity; and the cement industry, at 99.6% of capacity (Ministry of Statistics and Analysis of the Republic of Belarus, 2008, p. 340-360). Data on mineral production are in table 1.

Structure of the Mineral Industry

The Belarussian State Concern for Oil and Chemistry (Belneftekhim), which included among its many enterprises the country's oil production, refining, and transport facilities and potash production enterprise, was the leading concern in the country. It comprised 50 organizations, including practically all enterprises that produced chemical products. The country's only mineral production enterprise that played a major role in world markets was its potash production enterprise Belaruskali, which mined the Starobin deposit. Belaruskali was the world's third ranked potash producer in 2007 following Canada and Russia (Ober, 2008). Belaruskali comprised four mine and beneficiation complexes, auxiliary shops, and servicing units, which employed about 20,000 persons. Belaruskali produced potash fertilizers in the form of fine, and fine crystallized and granulated concentrate of potassium chloride. Besides potash fertilizer, Belaruskali produced a variety of salts used for domestic, industrial, and agricultural purposes. The founders of the Belarus potash company were Belaruskali and the Russian firm Open JSC Uralkali (Republican unitary enterprise Production Amalgamation Belaruskali, 2007).

In accordance with a decree issued on January 28, 2006, the President of Belarus established the production association Belarusian Steel Works (BSW). BSW comprised enterprises subordinate to the Ministry of Industry, one of which was the Rechitsa Hardware Plant. BSW also managed the Republic of Belarus' shares in the JSC Mogilev Metallurgical Works (Press Service of the President of the Republic of Belarus, 2006). Table 2 lists major mineral industry facilities in Belarus.

Commodity Review

Metals

Iron and Steel.—RUE BMZ engaged in three main production processes, which were steelmaking, steel rolling, and steel wire production. The steelmaking function consisted of a scrap preparation shop, two electric arc furnace shops, and a transport shop. The rolling section consisted of three rolling mills. The steel wire production unit consisted of three steel wire shops. In addition, RUE BMZ had a powder metallurgy shop, a dye production shop, and a number of infrastructure shops (Byelorussian Steel Works, 2006). In 2007, BMZ produced 2.214 Mt of steel, which was a 3.7% increase compared with that of 2006.

BMZ planned to increase production by 10% in 2008, but this was contingent on increasing the plant's supply of scrap. BMZ was engaged in contracting to buy more scrap from Russia but was also seeking supplies outside the country. BMZ was also recommending merging regional scrap collection units within the country and incorporating them in BMZ, which, according to BMZ, would lower the cost of raw materials and help control and optimize raw material supplies (Interfax Russia & CIS Metals and Mining Weekly, 2008).

Industrial Minerals

Potash.—Belaruskali was in charge of mining at the Starobin deposit. The company consisted of four mining directorates that conducted underground mining. The Starobin potash deposit is one of the largest in the world. It was discovered in 1949 and mining had been taking place there since 1962. The deposit consists of four separately delineated potash beds. The first, second, and third potash beds had been mined, but the majority of potash reserves occur in the third bed. Reserves in the second bed are practically depleted and the remaining reserves in the first bed have been reclassified as uneconomic. Because reserves at mining directorates nos. 1 and 2 are almost depleted, new sectors in areas that surround the deposit would need to be developed to maintain and expand production. Development had begun at the Krasnoslobodskiy sector to the east of mine no. 2, which was reported to host 345 Mt of potash salts containing 51.4 Mt of K_2O. Future development of other sectors adjacent to existing mines was also planned. The potash ore is primarily sylvinite (Smychnik, 2007).

Outlook

Belarus is expected to continue to be a major supplier of potash to world markets. A program for the development of Belaruskali for the period 2006–12 would address development of ore reserves and is based primarily on the construction of a new mine in the Krasnoslobodskiy area as well as on renovating out-of-date equipment. A main focus will be a steady increase in the quality and consumer properties of fertilizers to make them more competitive on the world market. Because it possesses a sufficient raw materials base, a high production potential, and highly qualified personnel, Belaruskali has the potential to be a major world potash supplier for many decades (Republican unitary enterprise Production Amalgamation Belaruskali, 2007).

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TABLE 1
BELARUS: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
METALS						
Steel:						
Crude		1,694	1,920	2,076	2,297 [r]	2,387
Rolled		1,451 [r]	1,676 [r]	1,839 [r]	2,047 [r]	2,192
Pipes		96,200	109,700	108,300	134,200 [r]	147,900
INDUSTRIAL MINERALS						
Cement		2,472	2,731	3,131	3,495	3,820
Diamond, synthetic[e]	thousand carats	25,000	25,000	25,000	25,000	25,000
Lime		658	727	785	853	925
Nitrogen, N content of ammonia	metric tons	766,000 [r]	767,000 [r]	774,000 [r]	815,000 [r, e]	830,000 [e]
Potash, K_2O equivalent		4,230	4,611 [r]	4,844	4,605	4,972
Salt[2]	metric tons	1,543,000	1,883,000	1,839,000	2,075,693 [r]	1,665,350
Sulfur	do.	22,292 [r]	32,288 [r]	48,663 [r]	38,567 [r]	41,031
Sulfuric acid		600	600	700	800	800
MINERAL FUELS AND RELATED MATERIALS						
Natural gas	million cubic meters	254	245	228	219 [r]	201
Peat, fuel use		1,802	2,008	2,307 [r]	2,125 [r]	2,507
Petroleum:						
Crude		1,820	1,804	1,785	1,780 [r]	1,760
Refined		15,774	18,451	19,802	21,253	21,349

[e] Estimated; estimated data are rounded to no more than three significant digits. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through February 28, 2009.

[3] Includes byproduct salt from potash production.

TABLE 2
BELARUS: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1]

(Metric tons)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Cement	Krichevskiy and Volkovysk plants	Mahilyowskaya and Wawkavysk Voblasts'	3,500,000 [2]
Diamond	Gomel Production Association "Kristall"	Homyel'skaya Voblast'	NA
Nitrogen, N content of ammonia	OJSC Grodno "Azot" [Belarussian State Concern for Oil and Chemistry (Belneftekhim)]	Hrodna region	1,000,000
Peat, fuel use	Production at 37 enterprises that produce mainly briquets	All regions of the country	5,000,000 [3]
Petroleum:			
Crude	Republican unitary enterprise (RUE) "Production Amalgamation "Belorusneft" [Belarussian State Concern for Oil and Chemistry (Belneftekhim)]	Rechitskoye, Ostashkovichskoye, Vishanskoye, Tishkovskoye, and Yuzhno-Ostashkovichskoye deposits, southeastern part of the country	2,000,000
Refined	JSC Mozyr oil refinery (Government, 42.7%, and Slavneft, 42.5%)	Gomel	16,000,000 [4]
Do.	Navapolatsk refinery (Naftan)	Vitebsk	10,800,000 [4]
Potash, K_2O equivalent	Republican Unitary Enterprise (RUE) Production Amalgamation "Belaruskali" [Belarussian State Concern for Oil and Chemistry (Belneftekhim)]	Starobin deposit, Salihorsk area	5,000,000
Steel:			
Crude	Belarusian Steel Works (BSW) [Ministry of Industry of Belarus]	Zhlobin	2,400,000
Pipe	do.	do.	250,000
Do.	JSC Mogilev Metallurgical Works [Belarusian Steel Works (BSW)]	Mahilyowskaya Voblast'	80,000

[e] Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

[1] Table includes data available through February 28, 2009.

[2] Total for both plants.

[3] Total peat for fuel use.

[4] Crude throughput.

THE MINERAL INDUSTRIES OF BELGIUM AND LUXEMBOURG

By Harold R. Newman

BELGIUM

Belgium has a diversified industrial and commercial base and is located at the heart of one of the world's most highly developed industrialized regions. It has an export-oriented economy and is an important mineral producer. Belgium's industry depended greatly on nondomestic markets, especially those of other European Union (EU) countries. About 76% of Belgium's exports went to EU countries. Trade statistics in this chapter are for the Belgium-Luxembourg Economic Union (BLEU). Belgium, Luxembourg, and the Netherlands (BENELUX) comprise the BENELUX custom unit, an economic union aimed at reinforcing cross-border cooperation between the three countries. More than 20% of United States exports to the EU go to the BENELUX (Emporiki Bank, 2007).

Minerals in the National Economy

Trading of diamond and processing of metals were the leading mineral industries in Belgium. The country had no economically exploitable reserves of coal or metal ores in 2007.

Because it hosts few natural resources of its own, the country must import substantial quantities of raw materials. The metal processing industries were significant to the Belgian economy in 2007, contributing about 27% of the gross domestic product (GDP). Europe's leading electrolytic copper refinery, a major zinc refinery, and one of the continent's leading lead refineries were located in Belgium (Encyclopedia of the Nations, 2007).

In addition, in 2007, Belgium retained its position as the world's diamond capital with more than 50% of the world's production of rough, polished, and industrial diamond passing through Antwerp (Antwerp World Diamond Center, 2007).

In 2006 (the latest year for which data were available), Belgium's industry, including minerals, accounted for 24% of the GDP. Exports and imports of mineral products included but were not limited to aluminum, which was valued at $2,784 million (for exports) and $3,115 million (for imports); copper, $3,212 million (exports) and $1,996 million (imports); diamond, other than industrial, $15,604 million (exports) and $13,948 million (imports); metalliferous ore and metal scrap, $3,417 million (exports) and $7,498 million (imports); mineral fuels, lubricants and related materials, $28,413 million (exports) and $47,722 million (imports); petroleum and related products, $18,985 million (exports) and $30,500 million (imports) (Belgium Foreign Trade Agency, 2007).

Production

Mining was less important to the country's economy than in the past and in 2007, mining was conducted only for industrial minerals. The refining of copper, minor metals, and zinc, and the production of steel were the leading mineral industries in Belgium. The country was also a producer of cadmium, cobalt, germanium, selenium, and tellurium. Belgium's well-developed industrial minerals sector included the production of such industrial materials as carbonates and cement, and such construction materials as dolomite, limestone, and silica sand (table 1).

Structure of the Mineral Industry

The principal mining and mineral-processing facilities in Belgium, with their locations and capacities, are listed in table 2. Most facilities were privately owned either by Belgian companies or other EU companies.

Commodity Review

Metals

Iron and Steel.—ArcelorMittal announced a plan to revamp the upstream and downstream steelworks at Seraing, near Liege, because of much stronger demand. The High Furnace no. 6 (HF6), which had a capacity of 1.5 million metric tons per year (Mt/yr), was closed in 2005 owing to weak demand but would reopen in 2007 at a cost of $28 million. The company planned to raise the HF6 capacity to 3.1 Mt/yr by 2010, provided that demand remains strong. The additional steel production was expected to be sold to the European market (Platts, 2007a).

Zinc.—In 2007, Nyrstar S.A. announced that it had taken ownership of the lead and zinc smelting and alloying assets of N.V. Umicore S.A. and Ziniflex Ltd., thereby formally launching the company and creating the world's leading zinc producer. The Zinifex assets were the Budel (Netherlands), Clarksville (Gordensville, Tennessee), and the Hobart and the Port Pirie (Australia) smelting and alloying operations. The Umicore assets were the Auby and the GM Metal (France) and the Balen and the Overpelt (Belgium) smelting and alloying operations. With operations on four continents, Nyrstar produced more than 1 million metric tons of zinc and zinc alloys in 2006, which was equivalent to 10% of the global market. Also, Nyrstar was one of the leading primary lead smelting and refining companies in the world (Mining Engineer, 2007).

Industrial Minerals

Diamond, Industrial.—The diamond district of Antwerp, which comprised four exchanges and about 1,500 diamond companies, was a leading diamond distribution center. Belgium was the world's leading exporter of diamond and precious stones and handled about 80% of world consumption of rough and polished diamond. One in two polished diamonds in the world was handled in Antwerp and eight in ten rough diamonds in the world were handled there. The United States remained the most important export market for cut diamond (Antwerp World Diamond Center, 2007).

In 2007, 9.4 million carats of polished diamond with a value of $10.7 billion was exported and 9.7 million carats of polished diamond with a value of $10 billion was imported. The diamond sector accounted for 8% of Belgium's total exports (International Diamond and Jewelry Exchange, 2008).

Stone, Dimension.—The region now known as Belgium has been an important producer of marble for more than 2,000 years and has long been recognized for the diversity and quality of its dimension stone. A dark blue-gray crinoidal limestone, which is referred to as "petit granit," was one of the most important facing stones that the country produced. All the marble quarries are located in the Walloon region. Red, black, and gray were the principal color ranges of the marble. Most of the marble production was exported to other EU countries.

Mineral Fuels and Other Sources of Energy

Coal.—E.On S.A. announced plans to build a $2.2 billion coal-fired power station in the Antwerp harbor area. The 1,100-megawatt (MW)-capacity plant would have an efficiency of 46% and 25% fewer carbon dioxide emissions than the average coal-fired plants currently in operation in Belgium. E.On stated that coal-fired power stations would continue to play an important role in the company's future energy mix, along with gas, nuclear energy, and renewable energies. The Antwerp harbor area was chosen because it is located close to large energy users, such as the chemical industry (Oilvoice, 2007).

Natural Gas.—The European Commission (EC) took steps to open up the Belgium gas market by obtaining commitments from the dominant gas utility, Distrigas, to cut volumes sold under long-term contracts. The EC made these commitments legally binding because of concerns that Distrigas might prevent other suppliers from entering the Belgium market in violation of the EC treaty rules on abuse of a dominant market position (Platts, 2007b).

Renewable Energy.—EdF Energies Nouvelles was building Belgium's first offshore wind farm at Thornton Bank, which is located 25 kilometers (km) off the coast. The first phase of the project would have a capacity of 30 MW. EdF stated that phase 1 of the project would involve the construction of six high-power wind turbines by October 2008, each with a capacity of 5 MW. The future wind farm was expected to have 60 wind turbines and be the largest wind farm in Europe. Construction of the entire project was expected to take place by 2012 (PennWell Corp., 2007).

Outlook

Belgium is expected to remain a significant mineral processor and major diamond trader in the world. It is also expected to remain significant in international and intra-European cargo handling of mineral products through its major ports. The four ports in Flanders (Antwerp, Ghent, Ostend, and Zeebrugge), which are all located within 100 km of each other, are leading players in international and intra-European cargo handling and are expected to remain so. The Port of Antwerp is a particularly important link in the chain of international trade. In 2007, annual traffic at Antwerp was 183 Mt. Bulk products, including coal, oil, and ores, made up 38% of tonnage and other commodities, such as chemical products, and iron and steel accounted for the remaining 62% (Federal Public Service Foreign Affairs, Foreign Trade and Development Cooperation, 2007).

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LUXEMBOURG

Minerals in the National Economy

In 2007, Luxembourg's mineral industry comprised mainly mineral information systems, mineral trading, and raw materials processing. Because it is a member of the BLEU, trade statistics for Luxembourg are inextricably linked with those of Belgium and, therefore, cannot be listed individually. International trade data for Belgium and Luxembourg are given in the Belgium section of this chapter. The iron and steel industry was Luxembourg's most important mineral industry sector, and steel was the country's main export commodity.

Production

Mining in Luxembourg was represented by small industrial mineral operations that produced material only for domestic consumption. These minerals included dolomite, limestone, sand and gravel, and slate. Information on these operations was not readily available. Some commodity production data are provided in table 1.

Structure of the Mineral Industry

The principal mineral facilities in Luxembourg with their locations and capacities are listed in table 2. Most facilities were privately owned.

Commodity Review

Metals

Iron and Steel.—The proposed merger of Arcelor S.A. and Mittal Steel N.V. was approved by their shareholders in 2007. A combination of the world's number one steel company (Arcelor) and the world's number two steel company (Mittal) would result in control of an estimated 11% of the world's annual output. The combination, to be named ArcelorMittal and based in Luxembourg, would create a world leader three times larger than its nearest rival, Nippon Steel Corp. of Japan (ArcelorMittal, 2007).

Acieries Reunies de Burbach-Eich-Dudelang (ARBED), a subsidiary of ArcelorMittal, dominated Luxembourg's mineral industry. ARBED was the major producer of crude steel, pig iron, and stainless steel, all of which were produced from imported material. The company specialized in the production of large structural beams and specialized value-added products.

Outlook

Luxembourg is expected to continue as a producer and exporter of steel. Industrial mineral production will be limited to that needed for domestic consumption.

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TABLE 1
BELGIUM AND LUXEMBOURG: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Country and commodity		2003	2004	2005	2006	2007[e]
BELGIUM[2]						
Metals:						
Aluminum, secondary including unspecified metals[e]		200	100	100	125	125
Arsenic, white[e]		1,200	1,200	--	--	--
Bismuth, metal[e]		600	500	500	500	500
Cadmium, primary		100	--	--	-- [r]	--
Cobalt, primary[3]		1,704	2,947	3,298	2,840 [e]	2,825 [4]
Copper:						
Smelter, secondary		117,500	107,700	97,200	114,600	87,000
Refined, primary and secondary[e]		425,000	383,000	382,000	382,600 [4]	380,000
Iron and steel:						
Pig iron	thousand metric tons	7,813	8,224	7,254	7,516 [r]	6,576 [4]
Steel:						
Crude	do.	11,128	11,698	8,906	11,238	10,692 [4]
Hot-rolled products	do.	13,169	13,269	11,274	12,000 [e]	12,000
Lead, refined, secondary		69,800	63,400	63,400	97,200 [e]	97,000
Selenium[e]		200	200	200	200	200
Tin, metal, secondary including alloys		7,700	8,900	7,800	7,600 [e]	8,400
Zinc:						
Slab:						
Primary		244,000	257,000	222,000	219,800	241,300 [4]
Secondary, possibly remelted zinc		42,000	46,000	40,000	40,000 [e]	40,000
Total		286,000	303,000	262,000	259,800 [r]	281,300 [4]
Powder[e]		20,000	20,000	20,000	20,000	20,000
Industrial minerals:						
Barite[e]		30	27	27	28	28
Cement	thousand metric tons	7,469	7,379	7,594	8,192	9,571 [4]
Clay, kaolin[e]	do.	429	459	460	460	460
Lime and dead-burned dolomite, quicklime[e]	do.	1,800	2,400	2,300	2,400	2,400
Nitrogen, N content of ammonia	do.	874	857	890	825	830
Sodium sulfate[e]	do.	250	250	250	250	250
Stone:						
Worked		23,734	21,649	21,188	18,798	19,000
Natural (excluding slate)		375,122	399,246	460,206	336,584	340,000
Sulfur:						
Byproducts:[e]						
Elemental		225,000	225,000	225,000	225,000	225,000
Other forms		175,000	175,000	175,000	175,000	175,000
Total		400,000	400,000	400,000	400,000	400,000
Sulfuric acid	thousand metric tons	1,235	1,332	1,332	1,393	1,400
Mineral fuels and related materials:						
Carbon black[e]	do.	1,000	1,000	1,000	1,000	1,000
Coke, all types	do.	3,200 [e]	3,200 [e]	2,599	2,895 [r]	2,607 [4]
Gas, manufactured	thousand cubic meters	340,000 [e]	340,000 [e]	472,478	425,504	463,659 [4]
Petroleum refinery products:[5]						
Liquefied petroleum gas	thousand 42-gallon barrels	15,605	12,304	10,669	10,247	10,968 [4]
Naphtha and white spirit	do.	21,908	20,540	14,531	11,158	14,356 [4]
Gasoline	do.	58,654	57,894	50,562	53,570	50,409 [4]
Kerosene	do.	100,849	95,533	13,005	13,512 [r]	13,566 [4]
Kerosene, other	do.	--	--	500	32,576 [r]	25,088 [4]
Distillate fuel oil	do.	--	--	89,056	94,443	95,755 [4]
Refinery gas	do.	--	--	3,682	3,864	3,874 [4]
Residual fuel oil	do.	57,872	55,811	53,563	47,472	49,227 [4]
Bitumen	do.	2,018	5,331	6,523	8,520	8,635 [4]
Total	do.	256,906 [r]	247,413 [r]	242,091 [r]	275,362 [r]	271,878 [4]

See footnotes at end of table.

TABLE 1—Continued

BELGIUM AND LUXEMBOURG: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Country and commodity		2003	2004	2005	2006	2007[e]
LUXEMBOURG						
Metals, steel:						
Crude	thousand metric tons	2,675	2,684	2,194	2,802	2,858 [4]
Hot-rolled products	do.	2,720	2,801	2,564	2,800 [e]	2,800
Industrial minerals:						
Cement, hydraulic[e]		700,000	700,000	700,000	700,000	700,000
Phosphates, Thomas slag:[e]						
Gross weight		475,000	475,000	475,000	475,000	475,000
P_2O_5 content		70,000	70,000	70,000	70,000	70,000

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through August 31, 2008.

[2] In addition to the commodities listed, Belgium produced a number of other metals and alloys, for which only aggregate output figures were available.

[3] Production reported by n.v. Umicore s.a. includes production from China and South Africa.

[4] Reported figure.

[5] Conversion factors from metric tons to 42-gallon barrels for petroleum refinery products are as follows: liquefied petroelum gas—11.6; naphtha and white spirit—8.5; gasoline—10; kerosene—7.75; distillate fuel oil—7.46; refinery gas—8.04; residual fuel oil—6.66; and bitumen—6.06.

TABLE 2
BELGIUM AND LUXEMBOURG: STRUCTURE OF THE MINERAL INDUSTRIES IN 2007

(Thousand metric tons unless otherwise specified)

Country and commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
BELGIUM				
Cadmium, metal	metric tons	N.V. Umicore S.A. (Sté. Générale de Belgique, 50.2%)	Balen	1,800
Cement		Major companies:	Plants:	8,400
Do.		Cimenteries CBR SA (HeidelbergCement Group)	Major plants at Lixhe, Mons/Obourg, Harmignies, Marchienne, and Ghent	3,200
Do.		Ciments d'Obourg SA (Holcim Group)	Plants at Obourg and Thieu	2,800
Do.		Compagnie des Ciment Belge (Ciments Francais S.A.)	Plant at Gaurain-Ramecroix	2,400[1]
Cobalt	metric tons	N.V. Umicore S.A. (Sté. Générale de Belgique, 50.2%)	Refinery at Olen	500
Copper		do.	Smelter at Antwerp-Hoboken	50
Do.		do.	Refinery at Olen	330
Do.		Metallo-Chimique NV	Smelter at Beerse	80
Dolomite		SA Dolomeuse (Group Lhoist)	Quarry at Marche les Dames	500
Do.		do.	Plant at Marche les Dames	750
Do.		SA de Marche-les-Dames (Group Lhoist)	Quarries at Nameche	3,000
Do.		do.	Plant at Nameche	3,000
Do.		SA Dolomies de Merlemont (Group Lhoist)	Quarry at Philippeville	100
Lead, metal		Nyrstar S.A.	Smelter at Antwerp-Hoboken	90
Do.		do.	Refinery at Antwerp-Hoboken	125
Limestone		Carmeuse S.A. (Long View Investment NV)	Mines and plant at Engis	1,850
Do.		do.	Mines and plant at Frasnes	450
Do.		do.	Mines and plant at Maizeret	850
Do.		do.	Mines and plant at Moha	800
Do.		SA Transcar (Royal Volker Stevin)	Mines and plant at Maizeret	850
Petroleum, refined	42-gallon berrels per day	Companies: Total S.A.	Refineries, of which: Refinery at Antwerp	268,000
Do.	do.	SA Esso NV	do.	239,000
Do.	do.	Nynas Petroleum NV	do.	125,000
Do.	do.	Belgian Refining Corp.	do.	80,000
Do.	do.	Petroplus Refining Antwerp NV	do.	55,000
Salt		Zoutman NV	Plant at Roeselare	200
Sand, silica		SRC-Sibelco SA	Mines and plants at Lommel, Mol, and Maasmechelen	500
Steel		Companies:	Of which:	14,000
Do.		Cockerill Sambre SA (Government of Wallonia, 80%)	Plants at Liege and Charleroi	(5,000)
Do.		Sidmar NV (Belgian Government, 28.24%, and Arcelor Group, 71.76%)	Plant at Ghent	(3,960)
Do.		Usines Gustave Boël NV	Plant at La Louviere	(2,020)
Do.		Forges de Clabecq SA	Plant at Clabecq	(1,500)
Do.		SA Fabrique de Fer de Charleroi	Plant at Charleroi	(600)
Do.		ALZ NV	Plant at Genk-Zuid	(360)
Do.		New Tubemeuse (NTW) SA	Plant at Flemalle	(300)
Zinc, metal		Nyrstar S.A.	Smelter and refinery at Balen	450
LUXEMBOURG				
Cement		SA des Ciments Luxembourgeois (Acieries Reunies de Burbach-Eich-Dudelang, 50.2%, and Sté. Générale de Belgique, 25%)	Plant at Esch-sur-Alzette	450
Do.		Intermoselle SARL (Acieries Reunies de Burbach-Eich) Dudelang, 33%)	Plant at Rumelange	1,000
Steel		Acieries Reunies de Burbach-Eich-Dudelang (ArcelorMittal)	Plants at Differdange, Dudelange, Esch-Belval, Esch-Schifflange	5,320
Do.		Arcelor Differdange SA (ArcelorMittal)	Plant at Differdange	1,200
Do.		Ugine & ALZ Carnox (ArcelorMittal)	do.	1,000

Do., do. Ditto.

[1] Includes the capacity of the company SA Ciments de Haccourt.

THE MINERAL INDUSTRY OF BOSNIA AND HERZEGOVINA

By Mark Brininstool

According to its Constitution, Bosnia and Herzegovina comprises two distinct entities—the Federation of Bosnia and Herzegovina (the Federation) and the Republika Srpska (RS). Establishment of the two entities was a result of the Dayton Peace Agreement signed in December 1995, which ended the war fought in Bosnia between 1992 and 1995. Because each entity had different resources and a certain degree of political and economic autonomy, their industrial capacities were developing at different rates. The Federation accounted for a larger share of mineral industry activity, whereas the RS was a more important agricultural region.

Minerals in the National Economy

In 2007, Bosnia and Herzegovina's gross domestic product (GDP) at constant prices increased by 6.8% compared with the GDP in 2006. The Federation produced about 63% of the total GDP. The value of mining and quarrying output increased by 5.3% at constant prices and accounted for 1.8% of the GDP (Agency for the Statistics of Bosnia and Herzegovina, 2008b). In the Federation, the total value of industrial production at constant prices increased by 9.1% compared with output in 2006, and that of mining and quarrying increased by 10.2% (Federation of Bosnia and Herzegovina Federal Office of Statistics, 2008, p. 8). In the RS, the value of mining and quarrying production at constant prices increased by 2.1% compared with that of 2006 and made up 2.1% of the GDP (Republika Srpska Institute of Statistics, 2008). In terms of export revenue, metals and metal products made up 30.2% of the total in 2007; coke, refined oil products, and nuclear fuel, 3.5%; mining and quarrying, 3.2%; and nonmetallic mineral products, 1.7% (Agency for the Statistics of Bosnia and Herzegovina, 2008a, p. 17). Mining and quarrying and nonmetallic mineral products were not defined, but it is assumed that mining and quarrying includes unprocessed metallic and nonmetallic minerals and that nonmetallic mineral products includes industrial minerals, such as cement, although this could not be confirmed.

Production

Bosnia and Herzegovina had important aluminum and steel production facilities and major local mineral resources of bauxite, iron ore, and lead-zinc ore. During the war in Bosnia from 1992 to 1995, most major mineral production facilities were damaged significantly, and pre-war levels of production had only recently been achieved by some producers. In 2007, Bosnia and Herzegovina increased production of lead concentrates by 306%; crude steel, by 9.5%; aluminum, by 8.1%; and bauxite, by 1.5% compared with production in 2006. Lead metal production decreased by 97%; alumina production, by 22.8%; iron ore, by 14.4%; and ferroalloys, by 9.8%. For industrial minerals, there were significant increases in the production of dolomite (40.9%), bentonite (33.5%), salt (20.7%), crude gypsum (16.9%), and lime (8.7%). Significant production decreases were seen for barite concentrate (80.5%) and crude kaolin (51%). Coal production decreased by 2%, and production of petroleum refinery products increased by 5.4% (table 1).

Structure of the Mineral Industry

The mineral industry of Bosnia and Herzegovina was mostly privatized, with an important exception being aluminum producer Aluminij d.d. Mostar, which was still undergoing privatization. Aluminij and ArcelorMittal Zenica were the most economically important companies in the mineral industry in terms of the value of their output. Table 2 is a list of the major mineral industry facilities in Bosnia and Herzegovina.

Commodity Review

Metals

Aluminum.—In 2007, Bosnia and Herzegovina's only significant aluminum producer and its leading exporter, Aluminij, achieved record output of 121,750 metric tons of aluminum metal, which was more than 80% of the country's total aluminum production. In 2006, Aluminij had invested $15 million in its aluminum cast-house, which allowed for increases in its production capacity. The company planned to spend an additional $45 million to modernize its anode plant and further increase its output capacity (Aluminij d.d. Mostar, 2008). Following multiple delays, the Government selected a winning bid of about $178 million[1] by a consortium led by Glencore International AG of Switzerland for the privatization of 88% of Aluminij. According to the terms of the bid, Glencore was expected to invest between about $275 million and $550 million in Aluminij (Economist Intelligence Unit Views Wire, 2007). The deal was still far from certain as Glencore and all other bidding firms expressed concern about the cost of electricity and made a guaranteed supply of electricity at a reduced rate a condition of the deal. In late 2007, Government power company Elektroprivreda HZHB announced that Aluminij would face a 40-megawatt reduction in its power supply in 2008, which could make closing the deal more difficult (Jelin, 2008).

Iron and Steel.—Reported crude steel production in Bosnia and Herzegovina increased by 9.5% compared with production in 2006. ArcelorMittal Zenica made significant progress on investments that could eventually increase its future annual production capacity to 2 million metric tons per year of steel (Bosnia News, 2008). Production of iron ore in Bosnia and Herzegovina decreased by about 14.4% compared with production in 2006 (table 3).

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[1] Where necessary, values have been converted from European Union euros (€) to U.S. dollars (US$) at the rate of €0.73=US$1.00.

Industrial Minerals

Significant increases in production were seen for sodium bicarbonate (43.1%), dolomite (40.9%), salt (20.7%), gypsum (16.9%), lime (8.7%), and cement (4.7%). Barite, crude kaolin, and quartz production decreased by 80.5%, 51%, and 5.6%, respectively.

Mineral Fuels

Production of brown coal and lignite decreased by 2% and production of petroleum refinery products increased by 5.4% compared with production in 2006. The major development in Bosnia and Herzegovina's mineral fuels industry in 2007 was the privatization of Bosanski Brod, which was the nation's only oil refinery. Bosanski Brod, the Modrica motor oil plant, and the fuel retailer Petrol were sold to the Russian state-owned company Zarubezhneft for about $88.4 million. The company was also obligated to make about $730 million worth of investments in the three companies (AFX News Ltd., 2007; Stanic, 2007).

Outlook

Into the foreseeable future, aluminum and steel production and exports are expected to continue to be the most important economic activities in the mineral sector. Aluminum production could see increases if the Aluminij aluminum plant is successfully privatized, although negotiations are still tenuous. Overall, production in the mineral industry is likely to continue to grow at a modest pace if the economy grows and improvements in the country's infrastructure are made.

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TABLE 1
BOSNIA AND HERZEGOVINA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
METALS						
Aluminum:						
Bauxite		573,000	916,928	1,031,618	854,047 [r]	866,933
Alumina, metallurgical grade		35,011	356,844	447,260	393,580 [r]	303,799
Metal, ingot, primary and secondary		112,503	121,296	131,232	136,190	147,193
Iron and steel:						
Ore and concentrate:						
Gross weight		126,929	280,596	3,176,748	3,439,587	2,943,963
Fe content[e]		63,000	140,000 [r]	1,500,000	1,450,000 [r]	1,240,000
Metal:						
Ferroalloys		20,000 [e]	19,820	15,000 [e]	14,747 [r]	13,305
Pig iron[e]		60,000	60,000	60,000	60,000	60,000
Crude steel		166,368	117,170	283,111	469,122	513,867
Semimanufactures[e]		113,000	150,000	150,000	200,000	200,000
Lead:						
Concentrate, gross weight		--	1,668	2,309 [r]	1,152 [r]	4,677
Metal, smelter, primary and secondary		100 [e]	35	79 [r]	33 [r]	1
Manganese ore:[e]						
Gross weight		2,000	2,000	2,000	2,000	2,000
Mn content		500	500	500	500	500
Zinc concentrate, Zn content		300 [r]	1,000 [r]	3,000 [r]	1,000 [r]	2,000
INDUSTRIAL MINERALS						
Barite concentrate		80 [e]	65 [e]	160	190	37
Cement	thousand metric tons	890,179	1,044,944	1,025,540	1,226,319	1,283,357
Clays:						
Bentonite		16,967	24,353	24,882	24,645 [r]	32,912
Ceramic clay, crude		35,861	16,784	14,553	15,000 [e]	15,000 [e]
Kaolin, crude		50,000	46,000 [3]	45,000	42,422	20,767
Dolomite, crude		96,776	223,378	128,639	109,693 [r]	154,518
Gypsum:						
Crude		63,050	139,520	152,939	131,936 [r]	154,294
Calcined[e]		6,042	6,000	6,000	6,000	6,000
Lime		79,302	146,000	186,000	218,121 [r]	237,190
Magnesite, crude[e]		2,000	2,000	2,000	2,000	2,000
Nitrogen, N content of ammonia[e]		500	218 [r, 3]	500	500	500
Quartz, quartzite, glass sand		50,000 [e]	190,315 [r]	119,831	711,399 [r]	671,336
Salt, all sources		200,000	260,500	392,240	416,305	502,487
Sand and gravel:						
Gravel		600,000 [e]	614,222	1,471,857	1,593,553	1,790,913
Sand, construction		80,000 [e]	90,581 [r]	574,490 [r]	20,835 [r]	98,267
Sodium compounds:						
Soda ash[e]		11,804 [3]	11,000	11,000	11,000	11,000
Caustic soda		5,000 [e]	3,916 [r]	11,424 [r]	12,156 [r]	12,200 [e]
Sodium bicarbonate		500 [e]	500 [e]	9,616 [r]	9,288 [r]	13,287
Stone (excluding quartz and quartzite), dimension, crude:[e]						
Ornamental	square meters	35,800	35,000	35,000	35,000	35,000
Crushed and brown, n.e.s.	thousand cubic meters	153	150	150	150	150
MINERAL FUELS AND RELATED MATERIALS						
Brown coal and lignite	thousand metric tons	9,006	8,896	9,144 [r]	9,965	9,765
Petroleum refinery products		72,000 [e]	110,000 [e]	109,782 [r]	10,797 [r]	11,379

[e] Estimated; estimated data are rounded to no more than three significant digits. [r] Revised. -- Zero.

[1] Table includes data available through March 31, 2009.

[2] In addition to commodities listed, common clay was also produced, but available information is inadequate to make reliable estimates of output.

[3] Reported figure.

TABLE 2

BOSNIA AND HERZEGOVINA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina		Ukio Banco Investment Group	Plants at Birac-Zvornik	600
Do.		Aluminij d.d. Mostar	Plant at Mostar	280
Aluminum		do.	Smelter at Mostar	250
Bauxite		Energoinvest	Mines at Vlasenica, Jajce, Bosanska Krupa, Posusje, Listica, Citluk, and other locations	2,000
Do.		A.D. Boksit Milici	Mine at Milici	1,500
Cement		Tvornica Cementa Kakanj d.d.	Plant at Kakanj	650
Do.		D.D. Fabrica Cementa Lukavac	Plant in Lukavac	500
Coal:				
Brown		SOUR Titovi Rudnici Uglja, Tuzla	Mines in BiH	12,000
Lignite		do.	do.	7,000
Ferroalloys		Elktrobosna, Elektrohemijska i Eletrotermijska Industrija	Plant at Jajce	80
Iron ore		ArcelorMittal Mines	Mines at Ljubija and Omarska	5,000
Lead-zinc ore		Energoinvest	Mine and mill at Srebrenica	300
Manganese ore		Mangan-Energoinvest	Mine and concentrator at Buzim	100
Petroleum, refined	thousand 42-gallon barrels per day	Zarubezhneft (through its Neftegazinkor unit)	Oil refinery at Bosanski Brod	100
Do.		do.	Oil refinery at Modrica	NA
Pig iron		B-H Steel-Zeljezara Ltd. (Kuwait Consulting and Investment, 50%, and Zeljezara Zenica Ltd., 50%)	Blast furnace at Zenica	2,250
Salt, rock	cubic meters per year	Hemijski Kombinat "Sodaso," Rudnik Soli i Solni Bunari	Mines at Tusanj	120,000
Do.	do.	do.	Production from brine at Tuzla, BiH	2,000,000
Steel, crude		ArcelorMittal Zenica (ArcelorMittal, 92%)	Plant at Zenica	1,000

Do., do. Ditto. NA Not available.

THE MINERAL INDUSTRY OF BULGARIA

By Mark Brininstool

Bulgaria's mineral industry included mine output of ferrous and nonferrous metals, mineral fuels (mainly coal), and such industrial minerals as clays, gypsum, and rock salt. Additionally, the metallurgical sector smelted and refined copper, gold, iron and steel, lead, silver, and zinc. Cement, dimension stone, and other construction materials also were produced. On a world scale, however, Bulgaria's mineral industry was small and mainly of regional importance. On January 1, 2007, Bulgaria joined the European Union (EU).

Minerals in the National Economy

In 2007, Bulgaria's GDP increased by about 6.2% compared with the country's GDP in 2006. The total value of industrial production increased by 12.7% in 2007 and accounted for about 26.5% of the GDP. In terms of output value, mining and quarrying of mineral fuels increased by 3.8%, whereas the mining and quarrying of metals and industrial minerals decreased by 1.1%. Mining and quarrying activities made up 4.4% of the value of industrial production. The value of the manufacture of industrial minerals increased by 10.7% compared with that of 2006, and the manufacture of basic metals and metal products increased by 8.2% (National Statistical Institute of the Republic of Bulgaria, 2008a; 2008b, p. 114-115).

Production

Within the metals sector, production increases were seen for cadmium (26.4%), refined lead (14.4%), refined copper (6.7%), refined zinc (4.9%), and gold (3.8%). Decreases in production were seen for silver (15.4%), lead content of ore (14.3%), zinc content of concentrate (9.6%), lead concentrate (7.8%), pig iron (6.8%), and crude steel (3.5%). Significant increases in industrial mineral production were reported for silica sand (120.4%), sand and gravel (14.7%), and crude gypsum (8.3%). Bentonite production decreased by 26.1%. Total coal production increased by 11.1% and natural gas production decreased by 43.2% compared with production in 2006.

Outlook

Bulgaria's membership in the EU is expected to result in the modernization and improvement of industrial facilities as the country works to reach EU standards for environmental protection and to attract foreign investment. The development of the industrial sector and expected benefits of EU membership, such as greater access to European markets, could result in a general increase in mineral production and exploration activity.

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TABLE 1
BULGARIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
METALS						
Aluminum, metal, secondary		2,420 [r]	3,762 [r]	5,107 [r]	12,825 [r]	12,800 [e]
Bismuth, metal[e]	thousand metric tons	40	30	35	30	30
Cadmium, metal, smelter		307	356	350	363 [r]	459
Copper:						
Ore:						
Gross weight	thousand metric tons	26,415	23,879	24,807	29,572	29,674
Cu content[e]	do.	116	107 [3]	112	124 [r]	116
Concentrate:						
Gross weight	do.	458	398	470	502	502
Cu content	do.	92	80	94	101	100
Metal, primary and secondary:						
Smelter		215,300	227,200 [r]	240,000 [r]	238,500 [r]	229,100
Refined, electrolytically		45,900 [r]	55,300 [r]	60,500	65,500	69,900
Gold, metal	kilograms	2,142	2,431	3,868	3,818	3,964
Iron and steel:						
Iron ore:						
Gross weight	thousand metric tons	466	83	--	--	--
Fe content	do.	127	27	--	--	--
Iron concentrates	do.	248	52 [e]	--	--	--
Metal:						
Pig iron for steelmaking	do.	1,386	1,158	1,081	1,147 [r]	1,069
Ferroalloys, ferrosilicon[e]	do.	10	10	10	10	10
Steel, crude	do.	2,317 [r]	2,106	1,969	2,124 [r]	2,050 [e]
Semimanufactures, rolled	do.	1,206	1,391	1,452	1,400 [e]	1,400 [e]
Lead:						
Mine output, Pb content		31,000	25,000	32,000	28,000	24,000 [e]
Concentrate:						
Gross weight		35,200	29,900	31,500	25,387	23,395
Pb content		24,600 [e]	19,000 [e]	22,050 [r]	17,771 [r]	16,377
Metal, refined, primary and secondary		69,000 [r]	65,968 [r]	80,824 [r]	76,028 [r]	86,956
Manganese ore:						
Gross weight		4,000	28,000	39,000	20,000	28,000
Mn content[e]		1,100	7,600	10,900	5,600	7,840
Silver, metal[e]		60 [r]	45 [r]	55 [r]	65 [r]	55
Tin, metal[e]		10	10	10	10	10
Uranium oxide, U content[e]		600	600	600	600	NA
Zinc:						
Mine output, Zn content[e]		31,000	19,000	22,000	17,000	16,000
Concentrate:						
Gross weight		26,000	29,900	33,700	25,917	23,474
Zn content[e]		18,800	15,500	17,500	13,500	12,200
Metal, refined, primary and secondary		86,800	102,110 [r]	95,077 [r]	95,341 [r]	99,992
INDUSTRIAL MINERALS						
Asbestos, fiber, all grades[e]		300	237	--	--	--
Barite ore, run-of-mine[e]		91,200 [r]	75,400 [r]	--	--	--
Cement, hydraulic	thousand metric tons	2,406 [r]	2,939 [r]	3,618 [r]	4,093 [r]	4,100 [e]
Clays:						
Bentonite	do.	146	225	181	134 [r]	99
Kaolin, raw	do.	1,137	1,291	1,381	1,658	1,631
Refractory	do.	40	30	30	15	15 [e]
Feldspar	do.	35 [r, e]	87 [r]	73 [r]	93 [r]	93 [e]
Fluorspar[e]	do.	2	2	2	2	2
Gypsum and anhydrite:						
Crude	do.	168	176	188	216	234
Calcined[e]	do.	50	60	65	75	75

See footnotes at end of table.

TABLE 1—Continued
BULGARIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
INDUSTRIAL MINERALS—Continued						
Lime, industrial	thousand metric tons	1,246 [r]	1,289 [r]	1,352 [r]	1,409 [r]	1,500 [e]
Limestone and dolomite	do.	3,500 [e]	3,500 [e]	3,265	3,340	3,335
Nitrogen, N content of ammonia	do.	321	320	320	309	310 [e]
Perlite	do.	17	8	15	5	14
Pyrites, gross weight[e]	do.	150	150	150	150	150
Salt, all types	do.	1,882	1,900	1,900	2,000	2,000
Sand and gravel	thousand cubic meters	2,098	3,333	3,628	4,293	4,925
Silica, quartz sand	thousand metric tons	412	545	583	250	551
Sodium carbonate, calcined[e]	do.	800	800	800	800	800
Sulfur:[e]						
S content of pyrites		30,000	25,000	25,000	25,000	25,000
Byproduct		289,000	301,000	300,000	300,000	300,000
Total		319,000	326,000	325,000	325,000	325,000
Sulfuric acid		891,600 [r]	976,500 [r]	1,020,000 [r]	1,009,500 [r]	1,010,000 [e]
Zeolite[e]		15,000	15,000	15,000	15,000	15,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, marketable:						
Anthracite	thousand metric tons	9	--	--	--	--
Bituminous	do.	44	170	96	52	18
Brown	do.	3,044	3,071	2,620	2,557	2,834
Lignite	do.	24,597	23,385	22,193	22,750	25,325
Total	do.	27,694	26,626	24,909	25,359	28,177
Coke[e]	do.	1,200	1,200	1,200	1,200	1,200
Natural gas, marketed	million cubic meters	11	333	537	519	295
Petroleum:						
Crude, reported	thousand metric tons	27	30	27	25	24
Refinery products[e]	thousand 42-gallon barrels	25,000	25,000	25,000	25,000	25,000

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. NA Not available.

-- Zero.

[1] Table includes data available through March 31, 2009.

[2] In addition to the commodities listed, chromite, magnesite, palladium, platinum, tellurium, uranium, and a variety of crude construction materials (common clays, dimension stone, and crushed stone) are produced, but available information is inadequate to make reliable estimates of output.

[3] Reported figure.

TABLE 2
BULGARIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Bentonite, mine output		S&B Industrial Minerals A.D.	Kardzali	280.
Cadmium		KCM S.A.	Plovdiv	320.
Do.		Lead and Zinc Complex Plc. (LZC)	Kurdjali	150.
Cement		Reka Devnia	Devnia	1,825.
Do.		Titan Zlatna Panega	Panega	1,300.
Do.		Other companies	Temelkovo, Dimitrovgrad, Pleven, and Beli Izvor	1,590.
Coal:				
Bituminous		Economic Mining and Power Combine (SMEK) Balkanbass	Balkan coal basin in central Bulgaria, northwest of Silven	445.
Brown		G. Dimitrov	Pernik coal basin, southwest of Sofia	4,000.
Do.		Other companies	Bobov Dol and Pirin in western Bulgaria	3,100.
Lignite		SMEK East Maritsa	East Maritsa coal basin near Zagora	25,000.
Do.		Other companies	Marbas, Pernik, and Bobov Dol coal basins	5,300.
Copper:				
Concentrate, Cu content		Asarel-Medet AD	Panagurishte, Pazardzhik District	55.
Do.		Dundee Precious Metals Inc.	Chelopech	15.
Do.		Bradtze	Malko Turnovo	2.
Do.		Elatsite-Med Ltd.	Elatsite	40.
Do.		Rosen	Burgas, near the Black Sea	1.
Do.		Tsar Asen	Srednogorie, Sofia District	2.
Do.		Burgaskii Mines Ltd., Zidorovo	Burgas, near the Black Sea	0.5.
Metal:				
Smelter		Cumerio Med S.A.	Pirdop	275.
Refined		do.	do.	70.
Iron ore		Kremikovtzi A.D.	Kremikovtzi	2,000.
Kaolin, mine output		Kaolin AD	Senovo, Rousse District	250.
Lead-zinc:				
Concentrate, Pb-Zn content		Gorubso Co.	Erma Reka, Kurdjali, and Laki, all in Madan area near Greek border	59 lead, 47 zinc.
Do.		Madzharovo Ltd.	Near Plovdiv	3 lead, 2 zinc.
Do.		Osogovo Ltd.	Osogovo Mountains, western Bulgaria	3 lead, 2 zinc.
Do.		Ustrem Ltd.	Near Thundza River, eastern Bulgaria	3.5 lead, 0.8 zinc.
Do.		Rudmetal JSC	Rudozem	3 lead, 2 zinc.
Metal:				
Pb, refined		KCM S.A.	Plovdiv	65.
Do.		Lead and Zinc Complex Plc. (LZC)	Kurdjali	33.
Zn, smelter		KCM S.A.	Plovdiv	60.
Do.		Lead and Zinc Complex, Plc. (LZC)	Kurdjali	33
Manganese ore		Mangan Ltd. (Obroschishte)	Varna District	50.
Natural gas	million cubic meters	Ministry of Power Supply	Chiren field, in northwest Bulgaria	550.
Perlite, mine output		S&B Industrial Minerals A.D.	Kardzali	30.
Petroleum:				
Crude		do.	do.	(1)
Refined	42-gallon barrels per day	Economic Trust for Petroleum Products	Refineries in Burgas, Pleven, and Ruse	260,000.
Silver		KCM S.A.	Plovdiv	100.
Steel, crude		Kremikovtzi A.D.	Near Sofia	2,300.
Do.		Stomana Industry S.A. (Sidenor, 90%)	Pernik	1,400.
Zeolite, mine output		S&B Industrial Minerals A.D.	Kardzali	15.

Do., do. Ditto

[1] Insignificant capacity.

THE MINERAL INDUSTRY OF CROATIA

By Mark Brininstool

Croatia produced a limited number of mineral commodities; petroleum extraction and refining were the major economic activities of the mineral industry. Industrial minerals were consumed mainly by the domestic market, and infrastructure projects, such as road building, affected their production. Production of metals was limited to aluminum and steel.

Minerals in the National Economy

Croatia's gross domestic product (GDP) increased by 5.6% in constant prices compared with the GDP in 2006. The total value of industrial production increased by 5.6% and the value of mining and quarrying activities increased by 2.8%. Production of natural gas and petroleum, which is considered a subsector of mining and quarrying by the Central Bureau of Statistics of the Republic of Croatia, increased by 1.9% in terms of value compared with production in 2006. In 2007, mineral products made up 15.8% of the value of total imports, and base metals and articles of base metals made up 11.3%. Croatia was dependent on mineral imports, particularly mineral fuel imports. Croatia also had a large trade deficit of mining and quarrying goods in 2007, with imports valued at about $2.7 billion and exports valued at $317 million. In 2007, imports of crude petroleum and natural gas made up about $2.5 billion of the total value of imports of mining and quarrying products (Central Bureau of Statistics of the Republic of Croatia, 2008, p. 209, 299, 383).

Production

In 2007, Croatia produced metals, including aluminum and steel; industrial minerals, including cement, clays, gypsum, and lime; and mineral fuels, including natural gas and petroleum. Production data were generally unavailable for 2007, and estimates were made for the output of most minerals (table 1).

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

Outlook

Croatia is expected to remain a modest producer of mineral goods, although increases in the production of industrial minerals could take place as infrastructure is modernized. Production of mineral fuels will most likely remain the most important outputs of Croatia's mineral sector.

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Central Bureau of Statistics of the Republic of Croatia, 2008, Statistical Yearbook 2008: Zagreb, Croatia, Central Bureau of Statistics of the Republic of Croatia, December, 829 p. (Accessed January 15, 2009, via http://www.dzs.hr/default_e.htm.)

TABLE 1
CROATIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007[e]
METALS						
Aluminum:						
Metal, ingot, secondary		1,200	5,500	6,256	2,457	2,500
Alloys		1,180	1,100	1,100 [e]	350	400
Semimanufactures, rolled[e]		38,114 [3]	35,000	35,000	20,000	20,000
Steel:						
Crude, from electric furnaces		43,380	80,000	73,640	80,516	75,000 [3]
Semimanufactures, hot rolled[e]		13,000	50,000	58,000	60,000	60,000
INDUSTRIAL MINERALS						
Cement	thousand metric tons	3,654	3,811	3,481	3,598 [r]	3,524 [3]
Clays:						
Bentonite		13,568	16,000	17,391	16,410	17,000
Ceramic clay		188,000	637,000	197,921	300,718	300,000
Gypsum:						
Crude		166,000	148,000	196,133	170,351	170,000
Calcined[e]		1,400	1,200	1,200	1,200	1,200
Lime	thousand metric tons	251	250	1,988	2,155	2,200
Nitrogen, N content of ammonia	do.	264 [r]	332 [r]	404 [r]	400 [e]	400
Pumice and related materials, volcanic tuff	do.	29	23	21	17	20
Salt, all sources		31,281	23,000	36,970	29,589	32,536 [3]
Sand and gravel, excluding glass sand		15,000 [e]	116,000 [e]	114,785	365,550	350,000
Silica:						
Quartz, quartzite, glass sand		237,141	128,000	130,888	139,730	140,000
Glass:[e]						
Flat glass	thousand square meters	495 [3]	400	400	400	400
Container glass		171,070 [3]	150,000	150,000	150,000	150,000
Other hollow glass		1,466 [3]	1,400	1,400	1,400	1,400
Stone, excluding quartz and quartzite, dimension stone, crude:						
Ornamental[e]	square meters	1,093,573 [3]	1,000,000	1,000,000	1,000,000	1,000,000
Crushed and brown, n.e.s.[4]	thousand metric tons	19,022	19,000 [e]	15,103	17,625	18,000
Other[e]	cubic meters	25,000	20,000	20,000	20,000	20,000
Sulfur, byproduct of petroleum[e]		7,471 [3]	7,500	7,500	7,500	7,500
MINERAL FUELS AND RELATED MATERIALS						
Carbon black[e]		21,497 [3]	21,000	20,000	20,000	20,000
Natural gas, gross production	million cubic meters	2,190	1,851	2,283	2,714	2,900
Petroleum:						
Crude, gross weight, includes condensate	thousand metric tons	1,052	1,155	980	917 [r]	900
Refinery products	do.	5,360 [r]	5,320 [r]	5,141 [r]	4,865 [r]	5,321 [3]

[e] Estimated; estimated data are rounded to no more than three significant digits. [r] Revised. do. Ditto.

[1] Table includes data available through March 31, 2009.

[2] In addition to commodities listed, common clay also was produced, but available information is inadequate to make reliable estimates of output.

[3] Reported figure.

[4] Not elsewhere specified.

TABLE 2
CROATIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Alumina		Jadral, Jadranski Aluminijum	Jadral Alumina Plant	150
Aluminum		Boris Kidric Tvornica Lakih Metala	Smelter at Sibenik	75
Do.		Top-Tvornica Olovni i Aluminjskikh	Semimanufactures producer at Savska	NA
Cement		Dalmacija Cement (CEMEX S.A.B. de C.V., 99%)	Sv. Jurai plant at Kastel Sucurac	1,300
Do.		do.	Sv. Kajo plant at Solin	750
Do.		do.	Majdan plant at Solin Majdan	780
Do.		Holcim (Hrvatska) d.o.o.	Plant at Koromacno	1,000
Do.		Istra Cement International d.d. (Part of CALUMEM Group)	Plant at Pula	70
Do.		Tvornica Cementa Umag D.D.	Cement plant at Umag	350
Do.		Nasicecement D.D.	Nacise plant at Tajnovac	1,000
Coal, bituminous		Istarski Ugljenokopi Rasa	Mines at Labin and Potpican	500
Natural gas	million cubic meters	INA-Industrija Nafte d.d. Zagreb (INA)	Natural gasfields at Bogsic Lug, Molve, and other locations	3,000
Petroleum, crude	thousand 42-gallon barrels per day	do.	Oilfields in Croatia and Slovenia (Benicanci, Zutica, Struzec, Ivanic Grad, Lendava, and other locations)	70
Do.	do.	do.	Refinery at Rijeka (Urinj)	160
Do.	do.	do.	Refinery at Sisak	150
Pig iron		Metalurski Kombinat Zeljezara Sisak	2 blast furnaces at Sisak	235
Salt	cubic meters	Solana Pag, Solana Ante Festin	Pag Island (marine salt)	13
Steel, crude		SP MK Zeljezare Sisak d.d.	Plant at Sisak	75
Do.		Zeljezara Split	Plant at Split	170

Do., do. Ditto. NA Not available.

THE MINERAL INDUSTRY OF CYPRUS

By Harold R. Newman

There was a strong tradition and culture of mining in Cyprus,[1] although the contribution of mining to the economy was not as important as in the past. Cyprus has a modern mining law that provides security of tenure and right of access to private land for exploration purposes. The sparse vegetation is conducive to outcrop mapping and ground surveys. The country had a well developed infrastructure to support exploration and mining operations. In 2007, the Government initiated a study on reviving the Cypriot mining industry and was encouraging certain types of joint ventures with Turkish Cypriots (EMED Mining Public Ltd., 2007).

Production

Data on mineral production are in table 1. The production of bentonite, cement, sand and gravel, and stone dominated the mineral industry of Cyprus. Other mineral commodities produced included common clay for brick and cement manufacture, gypsum, ocher, and umber.

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities. The facilities were privately owned.

Commodity Review

Metals

Copper.—EMED Mining Public Ltd. (EMED Mining) was a joint venture of EMED Mining of Cyprus (95%) and Hellenic Copper Mines Ltd. of Cyprus (5%). EMED Mining's exploration areas were centered largely within the Upper Pillow lavas of the Troodos ophiolite complex. The mineralization areas were volcanic-hosted massive sulfide copper deposits under shallow cover material (similar to past copper mines in the complex), three of which exceeded 10 million metric tons (Mt) of ore at grades of between 1% and 4.5% copper (EMED Mining Public Ltd., 2007).

EMED Mining completed a prefeasibility study of its Klirou copper-zinc project at yearend 2006. The study investigated an open pit operation exploiting a portion of an estimated inferred resource of 4.5 Mt at an average grade of 0.41% copper and 0.74% zinc. An independent review of the study was completed in late 2007 by AMC Consultants (UK) Ltd. This review outlined key areas for further work to be done in a full feasibility study, including diamond core drilling and collecting of samples for further metallurgical work, further assessment of the Mitsero processing plant, and preparation of a metallurgical design for a processing strategy. More feasibility work was planned with the aim of beginning development during 2008 if regulatory permits are granted (Thomson Reuters, 2008).

Industrial Minerals

Gypsum.—Abundant reserves of gypsum are found in Cyprus. Gypsum occurs in two well-defined groups—one is in a narrow arcuate zone that is parallel to the trend of the Kyrenia range in the north of the island and includes the Lupatza gypsum outcrop; the other occurs on the periphery of the Troodos igneous massif. Both of these deposits are of upper Miocene age (Minerals Zone, 2007).

Mineral Fuels

Natural Gas and Petroleum.—The Government opened an offshore licensing round, inviting foreign firms to apply for licenses to explore for natural gas and petroleum in 11 blocks totaling about 70,000 square kilometers in the Mediterranean waters south of Cyprus. The Government had established the Exclusive Economic Zone of the island in accordance with the United Nations Law of the Sea Convention and had adopted the Contiguous Zone Law of 2004 and the Exclusive Economic Zone Law of 2004. The Government stated that five international companies, reported to be from China, Russia, and the United States, had expressed an interest in these blocks. PGS Geophysical Co. of Norway completed a seismic survey and was processing the data (Petroleum Economist, 2007).

In 2007, the European Commission agreed that Cyprus was a sovereign state and had the right to sign international agreements and that the right could not be questioned. Following this finding, the Government stated that Egypt and Lebanon had given assurances that they would go ahead with natural gas and petroleum exploration deals with the island. Cyprus and Lebanon signed an agreement in 2007 to mark out their undersea border to facilitate future exploration. The Government signed a similar agreement with Egypt in 2006. All three countries agreed to jointly exploit potential natural gas and petroleum fields (Alexander's Gas & Oil Connections, 2007).

Outlook

In 2007, industrial infrastructure construction is expected to maintain the domestic demand for cement, gypsum, sand and gravel, and stone. International demand from the cat litter, construction, oilfield drilling fluids, and pigments industries is expected to maintain Cypriot exports of bentonite, gypsum, perlite, and umber. Natural gas and petroleum exploration is expected to continue.

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[1] Unless specifically stated, all data in this chapter are for the Republic of Cyprus in southern Cyprus because data related to areas of northern Cyprus administered by Turkish Cypriots are sparse or unavailable. The two areas have been separated since 1974.

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TABLE 1

CYPRUS: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007[e]
Cement, hydraulic		1,637	1,689	1,805	1,786	1,873[3]
Clays:						
Bentonite	metric tons	144,859	155,717	172,366	150,620	154,655[3]
Other:						
For brick and tile manufacture		350	425	443	400[e]	476[3]
For cement manufacture		550	565	600	540	620
Total		900	990	1,043	940[e]	1,096[3]
Copper, refined	metric tons	2,552	1,240	--	880	1,012[3]
Gypsum, crude[4]	do.	300,000	255,000	210,000	264,000	304,000
Lime, hydrated	do.	13,370	13,990	16,589	12,715[r]	13,497[3]
Petroleum refinery products:[5]						
Liquefied petroleum gases	thousand 42-gallon barrels	330	102	--	--	--
Gasoline	do.	1,242	336	--	--	--
Kerosene and jet fuel	do.	301	80	--	--	--
Distillate fuel oil	do.	2,437	657	--	--	--
Residual fuel oil	do.	2,411	774	--	--	--
Asphalt and bitumen	do.	194	42	--	--	--
Other	do.	--	--	--	--	--
Total	do.	6,916	1,991	--	--	--
Sand and stone:						
Limestone, crushed (Havara)		1,000	1,200	1,000	700	700
Marble		2	1	2	1	1
Marl, for cement production		2,220	2,290	2,450	2,210	2,540
Sand and gravel[6]		10,700	11,600	12,064	12,199	13,129[3]
Building stone[7]		103	105	51	57	60
Sulfur[e]	metric tons	1,300	300	--	--	--
Umber	do.	5,500	5,205	5,088	5,757[r]	4,363[3]

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through June 30, 2008.

[2] In addition to the commodities listed, small quantities of the mineral pigments ocher and terra verte are mined intermittently. Mineral production data from areas of northern Cyprus that are administered by Turkish Cypriots and production of fertilizers, perlite, and secondary metals from scrap are not included in this table because available information is inadequate to make reliable estimates of output.

[3] Reported sources of data include company annual reports, the Mines Service, and the Statistical Service of Cyprus.

[4] About 4,000 metric tons per year of gypsum was calcined.

[5] Refinery closed in April 2004. Petroleum refinery products are rounded to the nearest thousand barrels; may not add to totals shown.

[6] Includes crushed aggregate.

[7] Includes crude, semifinished, and worked stone.

TABLE 2
CYPRUS: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum:			
Secondary	A & E Aluminium Recycling Ltd.	Nicosia	NA
Semimanufactures	Muskita Aluminum Industries Ltd.	Extrusion presses, Limassol	18,000
Cement	Vassiliko Cement Works Ltd.	Vassiliko	1,260,000
Do.	Cyprus Cement Co. Ltd.	Moni	400,000
Do.	Bogaz Endustri ve Madencilik	Near Famagusta, Northern Cyprus	150,000
Clay, bentonite	Peletico Penta Ltd.	Mines at Pentakomo and Troulli	NA
Do.	Hellenic Mining Co.	Nicosia	NA
Do.	Drapia Mining Co. Ltd.	Drapia, Monagroulli, and Parsata	(1)
Do.	Oryktako Ltd.	Mine at Kato Moni and processing plant at Malounda	10,000
Do.	C & A Quarries Ltd.	NA	NA
Copper, cathode	Hellenic Copper Mines Ltd.	Skouriotissa	(2)
Gypsum	Peletico Ltd.	Quarry and processing plant at Aradipou, near Larnaca	NA
Do.	Zeiplast Chemical Industries Ltd.	Near Moni	NA
Perlite	Peletico Ltd.	Expanded perlite facility at Larnaka	NA
Do.	Zeiplast Chemical Industries Ltd.	Expanded perlite facility at Moni	NA
Petroleum, crude	Cyprus Petroleum Refinery Ltd.	Larnaca	(3)
Steel, semimanufactures	B.M.S. Metal Pipes Industries Ltd.	Tube and pipe mill, Paphos	15,000

Do. Ditto. NA Not available.

[1] Inactive.

[2] Production ceased in January 2005.

[3] Refinery closed in April 2004. Conversion of the facility to a petroleum product storage terminal that began in 2004 was ongoing.

THE MINERAL INDUSTRY OF THE CZECH REPUBLIC

By Mark Brininstool

The Czech Republic was an important Central European producer of heavy industrial goods manufactured by the country's chemical, machine building, and toolmaking industries. The production of construction materials, the mining and processing of industrial minerals, and steelmaking continued to be of domestic and regional importance.

Minerals in the National Economy

In 2007, the Czech Republic's real gross domestic product (GDP) grew by about 6.5% (Czech Statistical Office, 2008). The value of industrial production increased by about 8.2% compared with that of 2006; the value of mining and quarrying decreased by about 0.7%. The decrease in the value of mining and quarrying was owing to a 3% decrease in the value of production of mineral fuels and a 4.4% increase in the value of production of nonfuel minerals. Although the increase in the value of nonfuel minerals was greater in percentage terms, the greater value of mineral fuel production resulted in an overall decrease in the value of mining and quarrying production (Czech Statistical Office, 2009c). Mining and quarrying activities accounted for approximately 1.1% of the gross value added in the Czech economy and accounted for 3.5% of total employment in the country (Czech Statistical Office, 2009a, b).

Government Policies and Programs

Three main laws apply to the mineral industry in the Czech Republic. Act No. 44/1988 Coll., on mineral protection and exploitation, as amended, defines the classifications of reserved and nonreserved minerals. Under the Act, reserved deposits are "natural accumulations of reserved minerals" and are owned by the state. The Czech National Council Act No. 62/1988, on geological works, as amended, establishes the rules for "prospecting and exploration of reserved mineral deposits." Act No. 61/1988 Coll., on mining activity, explosives and on the state mining administration, as amended, lays out appropriate mining methods. The Ministry of the Environment enforces environmental laws in the mining sector and has authority to revoke exploration and mining leases if environmental laws are violated (Czech Geological Survey, 2007, p. 15-16).

Production

The Czech Republic reported small increases in production of pig iron and crude steel, whereas production of other metals was estimated to equal 2006 levels (table 1). In the industrial minerals category, reported production of bentonite and other clays, cement, feldspar, foundry sand, gypsum, and sulfuric acid increased significantly whereas diatomite, dolomite, and graphite had significant decreases in production. Reported figures for the production of mineral fuels were lower for almost every commodity. Crude petroleum and uranium production decreased significantly, and natural gas production remained at its 2006 level.

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

Commodity Review

Metals

Gold.—According to the Czech Geological Survey, as of December 31, 2006, total resources of gold were estimated to be almost 240 metric tons (t); reserves were about 84 t. Gold mining was limited owing to environmental concerns and a ban on the use of cyanide in mining processes. No gold had been produced in the Czech Republic since 1994 (Czech Geological Survey, 2007, p. 369).

Iron and Steel.—Pig iron production increased by 1.8%, crude steel production increased by 2.9%, and hot-rolled semimanufactures production increased by 3.3% compared with production in 2006. The Czech Republic had no economically exploitable iron ore deposits and therefore had to import all raw materials for use in the steel industry (Czech Geological Survey, 2007, p. 310). ArcelorMittal Ostrava a.s. and Trinecke Zelezarny a.s. were the dominant producers of steel in the Czech Republic, having produced more than 3 million metric tons (Mt) and 2.5 Mt of crude steel, respectively (Trinecke Zelezarny, a.s., 2008, p. 10; ArcelorMittal Ostrava a.s., 2009). ArcelorMittal Ostrava was known as Mittal Steel Ostrava until July 2007, when its parent company, Mittal Steel, merged with Arcelor S.A. After the merger of Mittal Steel and Arcelor S.A., the former Mittal Steel Ostrava plant became the property of the combined company (ArcelorMittal Ostrava a.s., 2007).

Industrial Minerals

Industrial minerals are the most abundant mineral resources in the Czech Republic. Production of anhydrite and gypsum increased by 312.5%; bentonite, by 25.5%; cement, by 15.6%; foundry sand, by 10%; and feldspar, by 5.5% compared with production in 2006. Production of diatomite decreased by 64.2%; graphite, by 40%; dolomite, by 5.9%; and kaolin, by 4.4% (table 1).

Mineral Fuels and Related Materials

Coal.—The Czech Republic produced 12,462 thousand metric tons of bituminous coal and 49,571 thousand metric tons of brown coal and lignite. Production of bituminous coal decreased by 4.3% whereas production of brown coal and lignite increased by 0.4% compared with production in 2006. Lignite is identified as a separate variety of brown coal with the lowest degree of coalification in the Czech Republic, and only about 437 thousand metric tons was produced in 2007 (table 1; Czech Geological Survey, 2007, p. 146). OKD a.s. Ostrava, which was the Czech Republic's dominant bituminous coal producer, announced that it intended to maintain production at about 12.5 million metric tons per year for the foreseeable future, which indicated that the country's overall level of production of bituminous coal would remain at 2007 production levels (OKD, a.s., 2008, p. 5).

Natural Gas.—Natural gas production remained at its 2006 level of 148 million cubic meters. The Czech Republic is dependent on imports to meet the majority of demand for natural gas, and in 2006 (the latest year for which data were available), net imports of natural gas amounted to 9,675 million cubic meters, of which about 75% was imported from Russia (Czech Geological Survey, 2007, p. 162).

Petroleum.—Production of crude petroleum decreased by 7.3% in 2007 compared with production in 2006. As with natural gas, the Czech Republic remained dependent on imports to supply domestic needs for petroleum and imported about 7.8 Mt and 7.7 Mt of crude petroleum in 2005 and 2006 (the latest years for which data were available), respectively. Russia was the country's main supplier of petroleum, and accounted for about 67% of the total petroleum imports in 2005 and 2006 (Czech Geological Survey, 2007, p. 154).

Uranium.—Uranium mine production fell by 15.9% compared with production in 2006. Uranium concentrate production fell by 18.7%.

Outlook

Production of aluminum, lead, and iron and steel is expected to remain stable with a continued dependence on imports of metal ores and concentrates. Dependence on imports of natural gas and petroleum will continue as long as no realistic alternative sources of energy are available.

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TABLE 1
CZECH REPUBLIC: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
METALS						
Aluminum, metal, secondary[e]		20,000	15,000	15,000	15,000	15,000
Iron and steel, metal:						
Pig iron	thousand metric tons	5,207 [r]	5,385	4,627 [r]	5,192 [r]	5,287
Steel, crude	do.	6,783 [r]	7,033	6,189	6,862	7,059
Semimanufactures, hot rolled	do.	7,338	6,947	5,423	6,100 [r, e]	6,300 [e]
Lead, metal, secondary[e]		26,000	25,000	26,000 [r]	26,100 [3]	26,000
Silver		-- [r]	-- [r]	-- [r]	-- [r]	--
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand metric tons	3,502 [r]	3,828 [r]	3,978	4,239 [r]	4,899
Clays:						
Bentonite	do.	199	224 [r]	216 [r]	267 [r]	335
Kaolin	do.	4,155	3,862	3,882	3,768	3,604
Other	do.	554	649	661 [r]	561	679
Diamond, synthetic[e]	carats	5,000	5,000	5,000	5,000	5,000
Diatomite		41,000	33,000	38,000	53,000	19,000
Dolomite		416,000	345,000	419,000	409,000	385,000
Feldspar		421,000	488,000	472,000	487,000	514,000
Fertilizer materials:[e]						
Nitrogenous, N content		251,000	271,000	270,000	270,000	270,000
Phosphatic, P_2O_5 content		100,000	100,000	100,000	100,000	100,000
Potassic, K_2O content		20,000	20,000	20,000	20,000	20,000
Mixed		36,000	30,000	30,000	30,000	30,000
Gemstones, crude, pyrope-bearing rock		53,000	42,000	43,000	39,000	40,000 [e]
Graphite		9,000	5,000	3,000	5,000	3,000
Gypsum and anhydrite, crude		104,000	71,000	25,000	16,000	66,000
Lime, hydrated and quicklime	thousand metric tons	1,250 [r]	1,264	1,211 [r]	1,218 [r]	1,220 [e]
Nitrogen, N content of ammonia[e]		235,000	240,000 [r]	250,000	250,000	225,000
Sand and gravel:						
Common sand and gravel	thousand cubic meters	9,109	8,664	9,080	9,130	9,185
Foundry sand	thousand metric tons	714	831	807	773	850
Glass sand	do.	904	829	920	963	942
Stone:						
Basalt, for casting[e]		13,000	12,000	12,000	10,000	10,000
Dimension stone	thousand cubic meters	244,000	273,000	288,000	242,000 [r]	242,000 [e]
Limestone and other calcareous stones	thousand metric tons	10,236	10,568	9,912 [r]	10,193 [r]	10,700 [e]
Building stone	thousand cubic meters	12,459	13,177	14,092	14,000 [e]	14,000 [e]
Sulfur, byproduct, all sources[e]		45,000	45,000	45,000	45,000	45,000
Sulfuric acid		239,000	234,000	230,000 [e]	263,000 [r, e]	275,900
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	thousand metric tons	13,382	14,648	12,778 [r]	13,017	12,462
Brown and lignite	do.	50,390	48,290	49,125	49,374	49,571
Coke	do.	3,556	3,538	3,412 [r]	3,428 [r]	3,500 [e]
Fuel briquets from brown coal	do.	314	300	300	345 [r]	345 [e]
Gas:						
Manufactured, all types[e]	million cubic meters	800	800	800	800	800
Natural, marketed[4]	do.	131	175	356	148	148
Petroleum:						
Crude:						
As reported	thousand metric tons	310	299	306	259	240
Converted	thousand 42-gallon barrels	2,102 [r]	2,027 [r]	2,075 [r]	1,756 [r]	1,627
Refinery products[e]	do.	35,000	35,000	35,000	35,000	35,000
Uranium:						
Mine output, U content		458	435	420	383	322
U_3O_8 content		540	513	495	452	380
Concentrate production, U content		452	412	409	358	291

See footnotes at end of table.

TABLE 1—Continued
CZECH REPUBLIC: PRODUCTION OF MINERAL COMMODITIES[1]

[e] Estimated; estimated data are rounded to no more than three significant digits. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through February 28, 2009.

[2] In addition to the commodities listed, arsenic, illite, secondary zinc metal, sodium compounds, talc, and zeolite are produced, but available information is inadequate make reliable estimates of output.

[3] Reported figure.

[4] Includes gas produced from coal mines. Gross output of natural gas is not reported but is believed to exceed reported marketed output by an inconsequential amount.

TABLE 2
CZECH REPUBLIC: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities[1]	Annual capacity
Aluminum, secondary	Alcan Decin Extrusions s.r.o.	Decin, northern Bohemia	40,000
Do.	Kovohute Holdings DT- Mnisek Division (majority owned by Demonta Trade SE)	Mnisek	70,000
Bentonite	Keramost a.s.	Most	250
Do.	LITH s.r.o.	Male Chvojno	NA
Cement	Ceskomoravsky Cement a.s. (100% owned by Heidelberg Cement AG)	Kraluv dvur	350
Do.	do.	Mokra	1,400
Do.	do.	Radotin	750
Do.	Lafarge Cement a.s.	Cizkovicka	1,200
Do.	Holcim (Cesko) a.s.	Prague	1,500
Do.	Cement Hranice a.s. (Dyckerhoff, 98%)	Hranice	1,100
Do.	Cemos Ostrava a.s. (Cement Hranice, 95%)	Ostrava	400
Clay	Ceske Lupkove Zavody a.s.	Nove Straseci (refractory clay)	120
Do.	Chlumcanske Keranicke Zavody a.s.	Chlumcany (kaolin)	30
Do.	Kaolin Hlubany a.s. (WBB Minerals, 94%)	Podborany	100
Coal:			
Bituminous	OKD a.s. Ostrava	Ostrava-Karvina, north Moravia	20,000
Brown	Severoceske Doly a.s.	Chomutov	14,000
Do.	Mostecka Uhelna Spolecnost a.s.	Most	17,000
Do.	Sokolovska Uhelna a.s.	Sokolov	30,000
Lignite	Lignit Hodonin s.r.o.	Hodonin, south Moravia	1,000
Gold	Kovohute Pribram Nastupickna a.s.	Pribram	9
Graphite	Grafitove doly Stare Mesto s.r.o.	Stare Mesto	10
Lead, metal, secondary, refined	Kovohute Pribram Nastupickna a.s.	Pribram	29
Natural gas million cubic meters	Gasfields in Brno and Ostrava regions, including:	Eastern/southeastern Czech Republic, of which:	500 [2]
	Ceska Naftarska Spol s.r.o.	Hodonin	NA
	Moravske Naftove Doly a.s.	do.	NA
	OKD Dulni Pruzkum a Bezpecnost a.s.	Paskov	NA
	UNIGEO a.s.	Ostrava-Hrabova	NA
Petroleum:			
Crude	Oilfields around Hodonin, including:	Of which:	160 [2]
	Moravske Naftove Doly a.s.	Hodonin	NA
	Ceska Naftarska Spol s.r.o.	do.	NA
	UNIMASTER s.r.o	do.	NA
Refinery thousand 42-gallon barrels per day	Kolin, Kralupy, Pardubice, and Litvinov	Bohemia	200
Steel, crude	ArcelorMittal Ostrava a.s. (Ispat-Nova Hut)	Kunice-Ostrava	3,800
Do.	Zelezarne Vitkovice (ZV) (Evraz Group)	Vitkovice-Ostrava	900
Do.	Trinecke Zelezarny a.s. (Trinecke Iron and Steel Works)	Trinec	3,000
Do.	Poldi Hutte s.r.o. (Scholz Edelstahl A.G.)	Kladno-Prague	1,700
Do.	Zelezarny Bila Cerkev	Hradek-Rokycany	300
Do.	Zelezarny Veseli, a.s.	Veseli and Moravou	300
Do.	Zelezarny Chomutov s.p.	Chomutov	350
Do.	Bohumin Iron and Steel Works	Bohumin	400
Titanium dioxide	Precheza A.S	Precheza	25
Uranium	DIAMO s.p.	Straz pod Ralskem	2

Do., do. Ditto. NA Not available.

[1] Names and locations of mines and crude oil refineries are identical.

[2] Annual capacity listed is total for all deposits, mines, or companies that produce the commodity.

THE MINERAL INDUSTRIES OF DENMARK, THE FAROE ISLANDS, AND GREENLAND

By Harold R. Newman

DENMARK

Denmark has an industrialized market economy, and the country's economic growth depended on imported raw materials and foreign trade. About two-thirds of foreign trade was with European Union (EU) member countries. Private ownership and exploitation of minerals were allowed under Danish law. The permitting procedures for mineral production were executed by individual counties, and regulations concerning the mineral industry were comparable with those of the other EU member countries (Ministry of Foreign Affairs, 2007).

Production

Denmark has no reserves of metallic ores, but it does have reserves of industrial minerals. Denmark's industrial minerals sector was based on easily accessible materials, such as chalk, clays, limestone, and sand and gravel, and was well developed. Denmark was the only commercial producer of moler, which consists of a natural mixture of diatomite and from 20% to 25% smectite clay and is an important ingredient of insulation bricks. The production of natural gas and petroleum from the Danish area of the North Sea was continuing (table 1).

Structure of the Mineral Industry

The Danish mineral industry was mostly privately owned. Table 2 is a list of the country's major mineral industry facilities and their capacities.

Commodity Review

Metals

Iron and Steel.—Uniscrap A/S, which was a joint venture of Alco-Metal A/S of Denmark and Scholz AG of Germany, was a major scrap merchant in Denmark with 20 sites across the country. Scholz was one of Europe's leading scrap merchants with 12 sites in Germany. Alco-Metal was a Danish merchant with mainly nonferrous and stainless steel scrap operations.

Uniscrap planned to become a deep-sea scrap exporter with the development of its 35,000-square-meter port facility at Grenaa. The new port facility would allow access to deep-sea markets, such as Egypt and Turkey. The existing port was only 6 to 7 meters (m) deep and was too shallow to allow deep-draft ships to enter. Uniscrap also planned to install a new 4,000-horsepower shredder at Grenaa to replace a smaller one (Metal Bulletin, 2007).

Industrial Minerals

Cement.—Aalborg Portland A/S was the sole producer of grey and white cement in Denmark. Aalborg operated seven kilns at its plant in Rordal, which had a capacity of 2.7 million metric tons (Mt) of grey cement and 850,000 metric tons of white cement. Aalborg produces cement with a low alumina content, which has a high resistance to sea water (Global Cement Magazine, 2007).

Stone, Crushed.—A/S Faxe Kalkbrud, which was owned by the Lhoist Group of Belgium, was a major producer of calcium carbonate from its deposits on the island of Zealand. Faxe was the only company in Denmark to use oyster shells as a source material for calcium carbonate (Industrial Minerals, 2007).

Mineral Fuels

Petroleum.—North Sea production of petroleum declined by 9.8% to an average of 4.7 million barrels per day. Denmark cut its petroleum production forecast by 9% until 2010. After producing 125.8 million barrels in 2006, Denmark produced 113.5 million barrels in 2007 owing to lower output from three fields and startup delays at a fourth. Petroleum reserves were reported to be 1.5 billion barrels as of January 1, 2007 (Upstreamonline, 2007).

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FAROE ISLANDS

The Faroe Islands have no significant identified mineral resources. The Faroese economy depended on fishing and salmon farming and was aided by a substantial annual subsidy from Denmark. Possible potential discoveries of oil in the future in the Faroese area gave hope for eventual oil production and diversification of its economy. The principal involvement of the Faroe Islands in the international mineral industry has been as a market for imported materials, principally cement, fertilizer materials, and fuels.

GREENLAND

Greenland is a self-governing overseas administrative division of Denmark. About one-half of Greenland's revenues came from grants from the Danish Government. The private and public sectors contributed to Greenland's economy. Hydrocarbon and mineral exploration activities were the focuses of foreign investment. Exploration was most active for base metals, diamond, gemstones, gold, nickel, and platinum-group metals (PGM).

Commodity Review

Metals

Gold.—The joint venture of Crew Gold Corp. and NunaMinerals A/S discovered the high-grade Nalunaq gold deposit in southern Greenland in 2004. NunaMinerals sold its shares in Nalunaq to its partner, Crew Gold, in 2007. The mine started operation during 2005 and the first gold was poured in March 2007. The mine had a total production of 1,639 kilograms at yearend 2007. The opening of Nalunaq was a milestone for Greenland, being its first gold mine and the first new mine to be developed in Greenland for more than 30 years. The mine is located about 40 kilometers (km) northeast of the town of Nanortalik on the southernmost tip of Greenland and is a Proterozoic narrow-vein high-grade gold-only deposit (Crew Gold Corp., 2007).

Molybdenum.—Quadra Mining Ltd. announced that its subsidiary International Molybdenum plc had commenced a feasibility study that was required for the company to make a development decision on the Malmbjerg molybdenum project. Work included infill and geotechnical drilling, pilot plant testing of a bulk sample, environmental permitting applications, basic engineering, and cost studies. The Malmbjerg project is located on the east coast of Greenland and was one of the country's highest grade molybdenum projects that was amenable to open pit mining (Quadra Mining Ltd., 2007).

Nickel.—NunaMinerals A/S's Ammassalik nickel project, which was located in southeastern Greenland and was formerly owned by Diamond Fields International Ltd. of South Africa, consisted of two adjacent properties that had a combined area of 63,737 hectares; it also had associated copper and PGM mineralization. NunaMinerals reported that exploration had led to the discovery of several nickel-bearing structures on the southern side of Ammassalik Island and the southern coast of the Johan Petersen Fjord. The largest discovery was a nickel-and-copper-bearing sulfide lens that is 90 to 100 m long and 1 m to 8 m wide. Bulk samples collected showed an average content of about 1.45% nickel and 0.5% copper. In terms of the estimated grade of the ore, the nickel content was 4.7% and the copper content was 1.6% (NunaMinerals A/S, 2007).

Zinc.—Angus & Ross plc was continuing with its exploration program at the Black Angel Mine area in 2007. Angus & Ross had completed an extensive drilling program in 2006 and was continuing with a drilling program that was concentrated on the South Lakes Glacier prospect. The previous reserves within the Black Angel Mine itself were estimated to be 1.7 Mt at grades of 9.7% zinc and 3.1% lead (Angus & Ross plc, 2007).

Industrial Minerals

Diamond.—Hudson Resources Inc. announced that it was recovering larger stones as exploration continued and targets were narrowed. The initial phase of processing the 47-t sample from the Garnet Lake kimberlite resulted in recovery of 236 diamonds, including 12 diamonds that weighed more than 0.10 carat. The largest diamond weighed 2.39 carats (Greenland Mineral Exploration Newsletter, 2007).

Gemstones.—True North Gems Inc. announced a $3 million exploration program for rubies on the 110-square-kilometer (km^2) property located near the village of Fiskenaesset on the southwest coast of Greenland. The exploration program included a 5,000-m diamond drilling program, bulk sampling, and geologic mapping. In addition, True North planned to upgrade the Fiskenaesset processing plant for the preparation of sized gravity concentrates (True North Gems Inc., 2007).

Mineral Fuels

Petroleum.—Husky Energy Inc. of Canada announced that, as a result of the West Disco 2006 Licensing Round, it had been awarded exploration licenses on Block 5 (for the period 2007-22) and Block 7 (for the period 2007-24). The two blocks, which cover an area of 21,067 km^2, are located about 120 kilometers offshore the west coast of Disko Island in water depths of less than 500 m. The second phase of the licensing round was initiated on August 1, 2007, and applications for the remaining Blocks, 1, 2, 3, and 8, could be submitted until February 1, 2008 (Rigzone, 2007).

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TABLE 1

DENMARK: ESTIMATED PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
Aluminum metal, secondary		18,000	20,000	20,000	25,000	30,000
Cement, hydraulic		2,020,000	2,050,000	2,120,000 [r]	2,115,000 [r, 3]	2,100,000
Chalk, calcium carbonate		1,900,000	1,950,000	1,950,000	1,900,000	1,950,000
Clays:						
Bentonite		16,303 [4]	18,352 [4]	18,515 [4]	18,500	18,500
Fire clay		25	25	25	25	25
Kaolin		2,500	2,500	2,500	2,500	2,500
Other		6,000	6,000	5,500	5,000	5,000
Moler, extracted	thousand cubic meters	232	233	234	240	235
Gas:						
Manufactured	million cubic meters	1,500	1,500	1,500	1,500	1,500
Natural:						
Gross	do.	8,300	9,000	10,540 [r, 4]	10,510 [r, 4]	10,500
Marketable	do.	7,300	8,200	9,500	9,500	9,500
Gold:[3]	kilograms	--	--	1,000	1,500	1,639 [4]
Iron and steel:						
Semimanufactures	thousand metric tons	429	516	--	--	--
Lime, hydrated and quicklime		115,000	116,000	120,000	115,000	115,000
Natural gas plant liquids	thousand 42-gallon barrels	46,000	47,000	48,000	48,000	48,000
Nitrogen, N content of ammonia		1,600	1,600	1,600	1,600	1,600
Peat		295,000	296,000	298,000	298,000	295,000
Petroleum:						
Crude	thousand 42-gallon barrels	133,000 [4]	144,465 [4]	137,605 [r, 4]	125,830 [r, 4]	113,515 [4]
Refinery products:						
Liquefied petroleum gas	do.	1,232 [4]	1,902 [4]	1,800 [r]	1,800	1,800
Gasoline	do.	15,264 [4]	16,881 [4]	15,400	16,000	15,000
Naphtha	do.	-- [4]	51 [4]	50 [r]	50	50
Jet fuel	do.	4,479 [4]	4,848 [4]	4,800	4,800	4,800
Distillate fuel oil	do.	25,300 [4]	24,834 [4]	26,000	26,000	25,000
Refinery gas	do.	2,331 [4]	2,100 [4]	2,200	2,200	2,000
Residual fuel oil	do.	11,136 [4]	10,370 [4]	11,300	11,300	11,000
Total	do.	59,742 [4]	60,986 [4]	61,600	62,200 [r]	59,700
Phosphates, crude, gross weight		1,400	1,400	1,400	1,400	1,400
Salt, all forms		560,000	610,000	610,000	600,000	600,000
Sand and gravel:						
From onshore deposits	thousand cubic meters	27,000	28,000	28,400	28,000	28,000
From offshore deposits	do.	600	600	600	600	600
Total	do.	27,600	28,600	29,000	28,600	28,600
Of which sand, industrial (sales)	do.	500	500	500	500	500
Stone:						
Dimension (mostly granite)		26,000	26,000	27,000	26,000	25,000
Limestone:						
Agricultural		700,000	700,000	700,000	700,000	700,000
Industrial		250,000	250,000	250,000	250,000	250,000
Sulfur, recovered		4,751 [4]	4,660	4,223 [4]	4,500	4,500

[r] Revised. do. Ditto. -- Zero.

[1] Estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2] Table includes data available through September 30, 2008.

[3] Production from Greenland Island.

[4] Reported figure.

TABLE 2
DENMARK: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement		Aalborg Portland A/S	Plant at Rordal	2,700
Chalk, calcium carbonate		A/S Faxe Kalkbrud	Quarries at Stevns and Sigerslev	250
Diatomite, moler	thousand cubic meters	Dansk Moler Industri A/S (Damolin)	Quarries on Mors and Fur Islands	145
Kaolin		Aalborg Portland A/S	Mine and plant on Bornholm Island	25
Lime		A/S Faxe Kalkbrud (Aalborg Portland Holding A/S)	Plant at Stubberup, near Fakse, on Zealand Island	200
Natural gas	million cubic meters	Maersk Olie og Gas A/S	Roar and Tyra Gasfields, Danish North Sea	2,550
Petroleum:				
Crude	barrels per day	Dansk Undergrounds Consortium	Dan, Gorm, Rolf, and Tyra, Danish North Sea	127,000
Refined	do.	A/S Dansk Shell	Fredericia	55,000
Do.	do.	Kuwait Petroleun Refining A/S	Gulfhavn and Skaelskor	56,500
Do.	do.	Statoil A/S	Kalundborg	65,000
Salt		Dansk Salt I/S	Mine (brine) at Hvornum, plant at Mariager	600
Steel		Danish Steel Works Ltd. (Det Danske Stalvalsevaerk A/S) (30% Government owned)	Plant at Frederiksvaerk (closed in 2002)	750

Do., do. Ditto.

THE MINERAL INDUSTRIES OF ESTONIA, LATVIA, AND LITHUANIA

By Richard M. Levine, Mark Brininstool, and Glenn J. Wallace

ESTONIA

In 2007, Estonia continued its economic expansion and the gross domestic product (GDP) increased by 7.1% compared with that of 2006 (U.S. Department of State, 2008). Estonia's mining industry was primarily engaged in extracting oil shale, peat, and industrial minerals, which included clays, limestone, and sand and gravel.

The AS Silmet enterprise located in the northeast of Estonia was one of the leading rare metals (for example, rare-earth metals) producers in Europe. Silmet employed about 550 people. The enterprise included a factory for rare-earth metals separation, a factory for rare-metals production, and a metallurgical factory. The factory for rare-earth metals separation produced such products as carbonates, fluorides, hydroxides, oxides, and solutions as well as liquid nitric fertilizers. The factory for rare metals produced ammonium bifluoride, hydroxides, oxides, and rare metals. The metallurgical factory produced metallic products, which included hydrides, metallic powders, niobium and tantalum chips, and rare-earth metals products, which included mischmetal, neodymium ferroboron alloys, and neodymium metal ingots. About 99% of the raw materials used in production at Silmet were imported and 99% of the products sold were exported (AS Silmet, 2008).

Estonia supplied more than 90% of its electricity needs with locally mined oil shale. It imported all its natural gas and petroleum, which equaled about 30% of its total energy consumption, from Russia. Alternative energy sources, which included biomass, peat, and wood, made up about 9% of primary energy production. An undersea electricity cable commissioned in December 2006 allowed Estonia to export electricity to Finland (U.S. Department of State, 2008).

Estonia has 64 ports along its coast, 31 of which handled commercial shipping and were open to vessels from other countries. Oil refinery products from Russia made up more than 50% of the cargo handled at the country's ports. The Port of Tallinn was the country's largest port in terms of freight handled. In the area of mineral shipments, Muuga Harbor, which was the main cargo handling harbor for the Port of Tallinn, handled crude oil and petroleum refinery products. The Paldiski South Harbor of the Port of Tallinn handled scrap metal, the Paljassaare Harbor of the Port of Tallinn handled petroleum refinery products and coal, the Kunda Port handled cement, the Sillamae Port handled metals and petroleum refinery products, and the AS Parnu Sadam Port handled peat (Enterprise Estonia, 2008).

Production

Estonia's main metals producing enterprise, Silmet, annually produced up to 3,000 metric tons (t) of rare-earth products and 700 t of rare-metal products (AS Silmet, 2008). Silmet was reportedly one of the world's leading producers of niobium metal chips. In 2007, Silmet began production of cerium carbonate 45 grade 99.9 (City of Sillamae, 2007; AS Simet, 2008).

Estonia was the leading producer of oil shale in Europe and had been mining high-grade marine oil shale (kukersite of Ordovician age) for many years. In 2007, about 16.4 million metric tons (Mt) of oil shale was mined from several underground and open pit mines, which was about a 16% increase compared with that of 2006 and was the largest amount of oil shale produced since the early 1990s. The increase in production was spurred by increased demand for fuel. On average, about 85% of the oil shale is burned as fuel in several large electric powerplants in northeastern Estonia; the remainder is retorted for shale oil, which is used in the manufacture of fuels and petrochemicals. Estonian oil shale manufacturers were participating in oil shale development in other countries. Eesti Energia AS, which was a state-owned company engaged in the production, sale, and transmission of electric power, was developing an oil shale mine in Jordan. Viru Keemia Grupp AS (VKG), which was the country's leading oil shale processing company and one of the world's leading shale oil producers, was participating in the development of the Boltyshk oil shale deposit in Ukraine (Viru Keemia Grupp AS, 2008, p. 13).

VKG, which in 2007 produced about 400,000 t of liquid fuels from oil shale, was projected to produce 1.7 Mt in 2015, which would cover the country's entire need for liquid fuel, including fuel for transport. VKG employed more than 1,400 people in Ida-Viru county and other parts of Estonia. In 2007, VKG began construction of a new shale oil plant with the capacity to process 900,000 metric tons per year (t/yr) of oil shale. VKG also held permits to develop oil shale mining in the country. In 2007, VKG began development of the Ojamaa underground mine, which was expected to achieve its design capacity to mine 2.5 million metric tons per year (Mt/yr) by 2011 (Dyni and Johnson, 2006; Parkman, 2008; Viru Keemia Grupp AS, 2008). Cement and lime production increased in 2007 in line with the country's economic growth. Data on mineral production are in table 1.

Structure of the Mineral Industry

Most of Estonia's mineral production was privately owned. Silmet was privatized in 1997 (AS Silmet, 2008). In 2005, the Estonian Silmet Group sold its majority holding in Silmet to Zimal SA of Switzerland, which controlled the Revda loparite mine in Russia and the Solikamsk magnesium works, also in Russia, through the Russian holding company Mineral Group (Estonian Economy, 2006). Oil shale production was Estonia's main raw material for energy production. Oil shale production was under the control of Eesti Energia, which owned the mines from which the oil shale was extracted (Eesti Energia AS, 2008). Oil shale mining was conducted by Eesti Põlevkivi

(Estonian Oil Shale Company), which was a subsidiary of Eesti Energia (Oil Shale Symposium, 2009). VKG, which processed oil shale, was privately owned.

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LATVIA

Latvia had the Baltic States' only steel mill. Other mineral commodity production was confined to industrial minerals used in construction, peat extraction, and production of a small amount of natural gas. In 2007, the country's GDP increased by an estimated 10.3% compared with that of 2006 (U.S. Central Intelligence Agency, 2008).

Ventspils Nafta Terminal LTD was the Baltic Sea region's leading oil and petroleum product transshipment terminal. Crude oil and petroleum products were received by pipeline and railways. The tank farm capacity of the enterprise exceeded 1 million cubic meters, which enabled the clients of the terminal to store products in case there is no immediate transshipment possibility owing to adverse conditions, such as weather, or in expectation of a better market price. The terminal also included among its services chemical analysis of oil and petroleum products in the company laboratory (Freeport of Ventspils Authority, 2008).

The Freeport of Riga, which was the country's second ranked port, handled cargo, which included mineral fertilizers, petroleum products, and various metals. About 80% of the products handled were transshipped from or to the Commonwealth of Independent States countries (Freeport of Riga Authority, 2008). The Port of Liepaja handled one-third less cargo than that of Riga. It handled among its mineral product cargo mainly metals and mineral fertilizers.

In July, the U.S. International Trade Commission determined that revoking the existing antidumping duty order on steel reinforced concrete bars from Latvia (among a number of other countries) would likely lead to a continuation or recurrence of material injury within a reasonably foreseeable time; therefore, the antidumping duty order was to remain in place (U.S. International Trade Commission, 2007). In 2007, iron and steel accounted for about 9% of the total value of Latvia's exports (Latvijas Statistika, 2008).

Production

The growth in Latvia's economy appeared to spur substantial increases in the production of mineral commodities used in infrastructure development, although information was not available to estimate 2007 production of cement or steel. Data on mineral production are in table 1.

Structure of the Mineral Industry

The Ports of Riga and Ventspils operate as freeports and the Port of Liepaja is part of the Liepaja Specialized Economic Zone. The country's steel mill, Liepajas Metalurgs, which was the country's main mineral industry enterprise, was a public joint-stock company (Liepajas Metallurgs, 2007).

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LITHUANIA

Lithuania's main mineral commodity production enterprises were its nitrogen fertilizer enterprise in Jonava and its petroleum refinery near Mazeikai. The country also produced industrial mineral products, which included cement, clays, and sand and gravel, and mineral fuels, which included peat and crude petroleum. Lithuania had the Baltic States' only nuclear powerplant; the plant, which was located at Ignalina, generated about 70% of the electric power consumed in Lithuania. The reactors at the plant, however, were of the RBMK-2 model that was involved in the accident at the Chernobyl plant in Ukraine (Energy Daily, 2007).

The Ignalina nuclear powerplant consisted of two units. The decommissioning of both the Ignalina nuclear powerplant's two units was one of the main issues in Lithuania's accession negotiations to the European Union (EU). The country closed unit 1 in December 2004 and was committed to shutting down unit 2. At the time, however, the EU recognized that entirely decommissioning the Ignalina nuclear powerplant would have to be delayed because of the extraordinary financial burden that closing down the plant would place on Lithuania—a burden that was disproportionate to Lithuania's economic capacity. The EU was committed to providing financial assistance for the closure of unit 2, which was scheduled for decommissioning in 2009 if sufficient financial resources were available from EU institutions and other donors to assist with the closure (Ignalina Nuclear Power Plant, 2008a). Lithuania wanted to continue using nuclear power and was planning to construct a new reactor using the infrastructure at Ignalina for this purpose. On December 8, 2006, a Joint Communiqué of the Prime Ministers' Council of the Baltic Council of Ministers along with Polish representation was signed in Vilnius, which stipulated agreement to cooperate in building and operating a new nuclear powerplant in Lithuania. The planned new reactor near Ignalina would consist of two units; at least one of the units was planned to be operational by 2015 (Lithuania in the European Union, 2007).

The country's Port of Klaipeda was a major transshipment center for mineral products, and, in particular, crude oil, fertilizers, and petroleum products. The completion of upgrades at the Butinge terminal at the Port of Klaipeda, which was connected to the Russian oil pipeline system, increased the country's ability to reexport crude oil and petroleum refinery products from Russia (U.S. Energy Information Administration, 2006).

Production

In 2007, Lithuania's GDP grew at a rate of 8.8% compared with that of 2006 (U.S. Central Intelligence Agency, 2008). Although production of cement and limestone increased compared with that of 2007, this increase in the GDP did not result in increases in all construction materials used in building the country's infrastructure. Production of crude oil and petroleum products also decreased in 2007 compared with that of 2006. The decrease in the production of refinery products had continued since 2006, when Russia cut off pipeline supplies to the country's AB Mazeikiu Nafta refinery, reportedly owing to technical problems caused by an accident on the pipeline that supplied the refinery. The accident took place shortly after the sale of controlling shares of the refinery to a Polish refiner PNK Orlen (Graham, 2006). Following the cutoff of supplies through the pipeline, the refinery had to transport oil a distance of about 90 kilometers to the Butinge terminal at the Port of Klaipeda (Interfax Central Europe News Agency, 2007).

Achema AB, which was a nitrogen fertilizer and chemical products manufacturer, was the country's other major mineral product production enterprise. On average, its annual production of fertilizers exceeded 2 Mt, which included compound and nitrogenous fertilizers. Achema AB employed more than 1,600 people. In 2006, Achema AB started production at a second ammonia plant, and production of ammonia more than doubled in 2007 (Achema AB, 2008a, b). Data on mineral production are in table 1.

Structure of the Mineral Industry

In 2007, controlling shares of the AB Mazeikiu Nafta petroleum refinery were owned by the Polish refiner PKN Orlen. PKN Orlen was the leading oil refiner in Central Europe and was part owned by the Polish state. Achema AB was privatized in 1994 (Achema AB, 2008b). The Ignalina nuclear powerplant was a state-owned enterprise (Ignalina Nuclear Power Plant, 2008b).

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TABLE 1
ESTONIA, LATVIA, AND LITHUANIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Country and commodity		2003	2004	2005	2006	2007
ESTONIA[2]						
Cement:						
Clinker		157,300	113,100	88,800	65,100	302,700
Portland, other		506,200	614,600	726,000 [r]	848,900 [r]	937,400
Clays:						
For brick	cubic meters[r]	134,900	136,600	151,800	231,400 [r]	214,000 [e]
For cement	do.	27,300	31,600	37,200	56,700 [r]	52,000 [e]
Coal	thousand metric tons	14,896	13,989	14,588	14,188	16,647
Coke, electrode		30,000	35,600	38,700	40,000	39,700
Dolomite:						
For building	cubic meters	291,200	323,400	261,700	378,300 [r]	356,000 [e]
For finishing	do.	3,200	1,300	2,000	1,660 [r]	2,700 [e]
For industry (technological limestone)	do.	150,800	171,900	155,300	128,540 [r]	210,000 [e]
Fuel oil		317,600	338,500	367,400	389,200	436,600
Gravel, pebbles, shingle and flint	cubic meters	NA	NA	597,100	NA	NA
Lead, metal, secondary		-- [r]	3,000	7,000 [e]	9,000 [e]	10,000
Lime		31,000	34,000	37,000	39,700	43,500
Limestone:						
For building	cubic meters	1,255,000	1,547,000	1,922,000	2,343,800 [r]	2,750,000 [e]
For cement	do.	372,200	430,500	335,100	340,300 [r]	480,000 [e]
For industry (technological limestone)	do.	62,500	93,900	86,300	87,600 [r]	126,000 [e]
Nitrogen, N content of ammonia		37,812 [r]	83,844 [r]	78,912 [r]	73,158 [r]	66,746
Oil shale	thousand metric tons	12,608 [r]	11,736 [r]	12,349 [r]	14,138	16,400
Peat	do.	1,089	767 [r]	1,034 [r]	1,208 [r]	964
For fuel	do.	362 [r]	279 [r]	378 [r]	507 [r]	475
Briquets	do.	120	68 [r]	68 [r]	101 [r]	128
Sand and gravel	cubic meters	4,468,400 [r]	3,131,000	3,227,200 [r]	4,214,200 [r]	5,275,900
Silica sand (technological sand)	do.	41,300 [r]	49,800 [r]	53,800 [r]	-- [r]	--
Sulfuric acid	kilograms	NA	31	NA	5	NA
LATVIA						
Cement:						
Clinker		241,104	252,685	NA	NA	NA
Other		295,205	283,647	280,000	280,000 [e]	W
Common clays and shales for construction use		174,896	208,391	NA	NA	NA
Crushed rock		NA	414,305 [r]	586,607 [r]	137,023 [r]	937,030
Diatomite		632	--	--	--	--
Dolomite, crude (excluding calcined, crushed dolomite aggregate)		789,796	810,137	1,675,882	1,688,643	NA
Gravel, pebbles, shingle and flint of a kind used for concrete aggregates, road metalling, or railway and other ballast		NA [r]	3,070,709 [r]	2,817,287	3,824,965	5,759,249
Gypsum		159,133	225,742	220,000 [e]	230,000 [e]	W
Limestone		431,590	443,987	420,000 [e]	NA	W
Peat		1,076,142	823,938	829,865	931,103	820,996
Sand and gravel		1,981,431	1,875,494	3,242,199	2,132,779	3,281,684
Silica sand, industrial		6,000 [r, e]	6,700 [r]	18,300 [r]	12,600 [r]	13,000 [e]
Steel, crude		545,626	553,684	550,000 [e]	550,000 [e]	W
LITHUANIA						
Cement, portland and other		596,857 [r]	753,069 [r]	832,076	1,065,367	1,105,365
Clays		240,800	228,100	289,465 [r]	385,275 [r]	384,850
Crushed stone used for concrete aggregates, roadstone, and other construction use		NA	NA	4,752,041	5,247,978	NA
Dolomite, crude (excluding calcined, crushed dolomite aggregate)		NA	NA	7,196	10,455	2,131
Granules, chippings and powder of stones, excluding marble		NA	NA	4,316	10,390	21,885

See footnotes at end of table.

TABLE 1—Continued

ESTONIA, LATVIA, AND LITHUANIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Country and commodity		2003	2004	2005	2006	2007
LITHUANIA—Continued						
Limestone		944,600	1,385,600	1,242,200	1,776,300	1,754,000
Marble granules, chippings and powder		NA	NA	666	1,167	1,244
Nitrogen, N content of ammonia		461,800	424,000	431,700	453,300	935,900
Peat		366,900	367,900	536,200	471,400	306,500
Petroleum:						
Crude		382,800	301,900	216,634	180,894	154,449
Refinery products		6,703,000	7,682,600	8,518,500	7,709,800	5,263,500
Sand and gravel:						
Construction sands		2,122,000 r	2,784,000 r	3,689,217	4,342,743	5,223,596
Gravel, pebbles, shingle and flint		2,672,000 r	3,051,000 r	3,345,185	3,290,568	3,958,004
Silica sand, industrial		49,700	58,300	46,500	42,600	45,400
Sulfur		48,515	67,094	74,277	61,135	42,618
Sulfuric acid	kilograms	1,002,000 r	1,019,000 r	713,200	730,253	747,494

e Estimated; estimated data are rounded to no more than three significant digits. r Revised. do. Ditto. NA Not available. W Withheld to avoid disclosing proprietary data. -- Zero.

[1] Table includes data available through December 31, 2008.

[2] In addition to the commodities listed, Estonia produces sulfur but available information is inadequate to make estimates of output.

THE MINERAL INDUSTRY OF FINLAND

By Harold R. Newman

Finland, which is a member country of the European Union (EU), has mining laws that encourage exploration and development, metallurgical expertise, a well developed infrastructure, and geology similar to that of Western Australia. The Government provides access to excellent geologic databases and other exploration services. The country's close proximity to the large EU market was a major competitive advantage for some raw materials, particularly aggregate, natural stone, and certain other industrial minerals. Several significant mining projects were underway in 2007.

Minerals in the National Economy

The geology of the Fennoscandian (or Baltic) Shield extends across much of Finland. Exploration in Finland was largely driven by the need to support the existing mining and mineral extraction infrastructure, although mining contributed less than 1% to the national economy. Investment in exploration increased to €50 million ($67 million) in 2007 from €38 million ($50 million)[1] in 2006. Among the companies that were most active in exploration were Edomines AB, Lappland Goldminers AB, Scandinavian Minerals Ltd., and Vulcan Resources Ltd. of Australia. The increase in investment of Nordic exploration was higher than the increase in investment of total world exploration. This investment was significant to the national economy of Finland, and the Government continued to encourage foreign investment in mineral exploration and investment (International Mining, 2007c).

The metal industry was one of the key sectors of the national economy. Copper refining and the production of other metals, although decreasing, continued to be significant. The output of the metal industry was largely exported.

Production

In 2007, metals were mined from 8 mines that produced 3.7 million metric tons (Mt) of ores; industrial minerals were mined from 34 mines and quarries that produced 16 Mt of ores.

Production of mine output copper content, mine output nickel content, and mine output zinc content increased whereas production of crude steel and silver metal decreased. Finland was the leading talc producer in Europe and the fifth ranked producer of wollastonite (Geological Survey of Finland, 2007a). Data on mineral production are in table 1.

Structure of the Mineral Industry

The mineral resource companies were mostly privately owned. However, the Government held an equity position in some of the major mining companies. The mineral industry operated on a free market basis. The country's mineral commodities, the locations of the companies that produce them, and the annual capacities of the companies' major facilities in Finland are listed in table 2.

Commodity Review

The Suurikuusikko gold deposit, which had an estimated inferred gold content of about 120 metric tons (t), was expected to become Europe's leading gold mine. The Talvivaara nickel deposit was the largest nickel deposit in Western Europe. Based on estimated proven reserves, the deposit had the potential to produce about 3% of the world's nickel during its scheduled 25-year operating life. A second important nickel project, the Kevitsa Mine, was under construction near Sodankylä. The nickel–platinum-group elements ore body is almost as extensive as that of Talvivaara. There was significant potential for new discoveries because the region had not been thoroughly examined for many commodities (Geological Survey of Finland, 2007b).

Metals

Cobalt and Copper.—Vulcan Resources was a base-metals development and exploration company whose primary focus in 2007 was the completion of a feasibility study on its Kylylahti project, which is located in eastern Finland. The project had an estimated resource of 7.8 Mt grading 0.24% cobalt, 1.17% copper, 0.22% nickel, 0.70 gram per metric ton (g/t) gold, and 0.49% zinc. Projected production during the expected 12 years of mine life was 600,000 metric tons per year (t/yr) of ore to produce 9,000 t/yr of copper, 1,300 t/yr of cobalt, 1,200 t/yr of nickel, and 224 kilograms per year (kg/yr) of gold in concentrate (International Mining, 2007b).

Gold.—Construction of Agnico-Eagle Mining Ltd.'s Kittila gold mine on the Suurikuusikko deposit was continuing. Production was planned to begin by yearend 2008 and to continue for 13 years. The Kittila Mine would initially be mined by an open pit method followed by underground mining using ramp access. The mining operation would feed a 3,000-metric-ton-per-day (t/d) surface processing plant. The mine was expected to produce 4,200 kg/yr of gold. Estimated probable reserves were 18.2 Mt at a grade of 5.1 g/t gold (Agnico-Eagle Mining Ltd., 2007).

Dragon Mining Ltd. of Australia (formerly Dragon Mining N.L.) was engaged in the exploration, development, and mining of gold projects in Finland. Dragon Mining owned the Vammala processing facility, which included the Jokisivu Mine, the Orivesi Mine, and the Vammala plant, Dragon Mining also had interests in the Hanhimaa deposit in the Central Lapland region of northern Finland; the Kuusamo deposit in northern Finland; and the Pampalo deposit in east-central Finland. In 2007, the

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[1] Where necessary, values have been converted from European Union euros (€) to U.S. dollars (US$) at a rate of €1.00=US$1.33.

Vammala facility produced about 15,800 kilograms (kg) of gold at a grade of 7.7 g/t gold (Dragon Mining Ltd., 2007).

Dragon Mining was continuing work to reopen the Orivesi Mine and reported that delineation drilling had intercepted high-grade ore, including 2.35 meters (m) grading 56.95 g/t gold and 3.65 m grading 106.70 g/t gold. The company extended the 285 access drive from the Kutema decline to the Sarvisuo area and advanced the Sarvisuo decline at a rate of about 70 meters per month. The object was to reach the 420-m level by yearend. Mining was continuing at the Kutema stopes and pillars. The ore produced was processed at the Vammala plant (International Mining, 2007a).

In 2007, Lappland Goldminers acquired the Haveri gold project from Northern Lion Gold Corp. of Vancouver, British Columbia, Canada. Haveri is located in the Tampere Schist Belt on the continuation of the Gold Line across the Bottnian Gulf to southwest Finland. Extensive exploration work had been carried out during the past few years, including the drilling of 126 diamond drill holes totaling 30,000 m. Haveri was considered to have the potential to become an important gold mine. The gold reserves at Haveri had previously been estimated to be 22,260 kg, but this estimate was not calculated in compliance with National Instrument 43-101 Standards of Disclosure for Mineral Projects, which was developed by the Canadian Securities Administration (Lappland Goldminers AB, 2007).

Iron and Steel.—The European market for processed iron ore was about 200 Mt, of which about 30 Mt was produced within Europe, mostly from the Kiruna Mine in Sweden. The balance was sourced mainly from Australia and Brazil. Production within the European market could result in significant savings on the cost of importing iron ore from the southern hemisphere.

Tertiary Minerals plc's Kolari iron ore project was focused on a magnetite iron ore target, Sivakkalehto, which is located in Kolaria at the heart of Finland's main iron ore district. Sivakkalehto was the most significant known magnetic anomaly in the Kolari iron district. Magnetic iron ore was last worked there in the 1980s by the Finnish company Rautaruukki Oy. A drilling and magnetic separation program conducted by Tertiary confirmed that wide intervals of near-surface magnetite iron mineralization with a magnetite content of about 30% was present over a significant strike length. The material was capable of being upgraded to a commercial product grading 68% iron with the potential for the production of sinter feed or high-grade pellets. The material would be mined by open pit (Tertiary Minerals plc, 2007).

Nickel.—Kevitsa, which is located in northern Finland, was one of the world's major undeveloped nickel sulfide deposits. In April 2007, Scandinavian Minerals commenced a feasibility study for the Kevitsa project. The study was based on an open pit operation mining about 5 Mt/yr with the production to be sold to local or foreign smelters. Scandinavian Minerals was also engaged in a metallurgical pilot plant project to optimize the metal grades and recoveries. The average grades of a 575 bulk sample were 0.44% copper, 0.186 g/t gold, and 0.36% nickel. Scandinavian Minerals announced that it had ordered grinding mills for the Kevitsa nickel property. The grinding mills would be designed to process about 5 Mt/yr of ore and would be fully autogenous (Scandinavian Minerals Ltd., 2007).

The nickel deposits of Talvivaara Mining Co. Ltd. were located in the southern part of the Kainuu schist zone. The deposits comprise two ore bodies—the Kolmsoppi and the Kuusilampi. Three mineralogical ore types include fine-grained dissemination, metacarbonate, and sulfide mineral content. The sulfide mineral content consisted mainly of chalcopyrite, pentlandite, pyrite, pyrrhotite, and sphalerite. The Talvivaara deposits were estimated to have 340 Mt of resources with average grades of 0.14% copper and 0.27% nickel. The ore bodies are well suited to open pit mining owing to a thin overburden and favorable resource geometry. The Talvivaara Mine life was estimated to be 25 years, and production could account for more than 2% of the world's nickel production when the mine becomes operational (Wiklund, 2007).

Mineral Fuels

Natural Gas.—The Government gave the Nord Stream consortium approval to start exploratory work in Finland's economic exclusion zone. The natural gas pipeline project came under criticism from countries bordering the Baltic Sea, including Portugal and Sweden, which were worried about the impact on the marine ecosystem and the security of their energy supply. Latvia asked for the pipeline to pass underground rather than through its waters. Nord Stream, which was controlled by Gazprom of Russia, planned to lay the 1,200-km pipeline along the bottom of the Baltic Sea between Vyborg, Russia, and Greifswald, Germany (Rigzone.com, 2007).

Outlook

The operating environment for mining companies in Finland is generally favorable for exploration and mining. It is expected to remain so. There is a significant potential for new mineral commodities to be discovered as exploration is expected to continue at a strong pace. The country has a long mining history and a traditional focus on primary resources. The Geological Survey of Finland will continue to identify mineral deposits and compile geosciences data. Mining and taxation laws are expected to remain favorable to the industry (Geological Survey of Finland, 2007a).

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TABLE 1
FINLAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007[e]
METALS						
Aluminum, metal, secondary	metric tons	32,619	39,266	34,127	35,773 [r]	44,223 [3]
Chromite:[e]						
Gross weight:						
Lump ore		210	240	235	219	221
Concentrate		329	330	326	320	325
Foundry sand		10	10	10	10	10
Total		549	580 [3]	571 [3]	549	556
Cr_2O_3 content:						
Lump ore		76	84	82	80	80
Concentrate		125	127	126	125	125
Foundry sand		5	5	5	5	5
Total		206	216 [3]	213 [3]	210	210
Cobalt, refined	metric tons	4,574	5,246	6,158	5,903	9,158 [3]
Copper:						
Concentrate, gross weight	do.	50,875	52,864	53,489 [r]	44,663	47,798 [3]
Mine output, Cu content	do.	14,900	15,500	15,600 [e]	13,000 [r]	13,600 [3]
Metal:						
Smelter	do.	176,384	168,577	177,216	192,235	144,705 [3]
Refined	do.	135,160	132,133	124,994	136,674	109,837 [3]
Gold, metal, mine output	kilograms	5,409	6,222	3,747	5,292 [r]	4,261 [3]
Iron and steel, metal:						
Pig iron		3,092	3,037	3,056	3,158	2,915 [3]
Ferroalloys, ferrochromium		250 [e]	264	235	243	242
Steel, crude		4,766	4,833	4,738	5,052	4,431 [3]
Semimanufactures, rolled[e]		3,900	3,950	4,000	4,200	4,000
Mercury	kilograms	25,000	24,000	34,200	22,879 [r]	45,195 [3]
Nickel:						
Mine output, Ni content	do.	3,640	3,700	3,386	2,985	3,465 [3]
Metal, electrolytic	metric tons	45,417	40,088	34,709	47,469 [r]	54,964 [3]
Platinum	kilograms	461	705	678	711 [r]	461
Selenium, metal	do.	49,163	61,250	57,208	70,458	52,459 [3]
Silver, metal	do.	31,115	37,413	24,822	38,428 [r]	33,447 [3]
Zinc:						
Mine output, Zn content	metric tons	70,652	69,333	72,474	66,109	72,118 [3]
Metal	do.	265,853	284,524	281,905	282,238	305,543 [3]

See footnotes at end of table.

TABLE 1—Continued
FINLAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]	2003	2004	2005	2006	2007[e]
INDUSTRIAL MINERALS					
Biotite	65,150	59,577	59,381	62,959	57,720 [3]
Cement, hydraulic	1,493	1,628	1,537	1,685 [r]	1,743 [3]
Feldspar metric tons	48,353	57,149	52,383 [r]	43,187	48,980 [3]
Lime	434	432	470 [r]	502	517
Mica metric tons	9,337	9,225	9,473	8,097	11,449 [3]
Nitrogen, N content of ammonia do.	77,100	60,600	73,592 [r]	91,356	100,623 [3]
Phosphate rock apatite concentrate:[e]					
Gross weight	799	838	823 [3]	858 [3]	860
P_2O_5 content	290	306	300 [3]	325 [3]	325
Pyrite, gross weight	677	702	489	495	509 [3]
Sodium sulfate	28	27	26	27	20
Stone, crushed:					
Limestone and dolomite:					
For cement manufacture	1,411	1,628	1,537	1,569 [r]	1,764 [3]
For agriculture	626	555	566	657	547 [3]
For lime manufacture	424	316	342	328	310
Fine powders	579	670	629	625 [e]	625
Metallurgical[e]	1	1	1	1	1
Total	3,041	3,170	3,075	3,161 [r]	3,247
Quartz silica sand	112	285	286	275 [r]	296
Sulfur:					
S content of pyrite	341	336	270 [e]	250 [e]	250
Byproduct:					
Metallurgy	305	301	300 [e]	300 [e]	300
Petroleum	60	65	70 [e]	70 [e]	70
Total	365	366	370 [e]	370 [e]	370
Sulfuric acid	1,036	1,141	1,057	971 [r]	904 [3]
Talc	460	492	508	559 [r]	536 [3]
Wollastonite metric tons	17,300	16,763	15,950	16,200	16,364 [3]
MINERAL FUELS AND RELATED MATERIALS					
Peat:					
For fuel use	8,415	8,159	7,696	6,919	8,100
For agriculture and other uses	929	905	778	896	1,000
Petroleum refinery products thousand 42-gallon barrels	54,956	61,037	78,796	79,835	80,000

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto.

[1] Table includes data available through November 30, 2008.

[2] In addition to the commodities listed, granite and soapstone were produced, but available information is inadequate to make reliable estimates of output.

[3] Reported figure.

TABLE 2
FINLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Ammonia		Kemira Oyj (Government, 98%)	Plant at Oulu	75
Apatite		Kemira Agro Oy (Government, 98%)	Mine and plant at Nivala	8,000
Cadmium, metal		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Kokkola	1
Cement		Finncement Oy (Irish Cement Ltd., 100%)	Plants at Lappeenranta and Parainen	1,020
Chromite		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Mine at Kemi	1,000
Copper:				
Ore, Cu content		Inmet Mining Corp.	Mines at Pyhasalmi, Saattopora, and Hitura	10
Metal		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Harjavalta	160
Do.		do.	Refinery at Pori	125
Feldspar		SP Minerals Oy (Partek Corp., 50.1%, and SCR-Silbeco SA, 49.9%)	Mine and plant at Kemio	50
Ferrochrome		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Tornio	250
Gold:				
Ore, Au content	metric tons	do.	Mine at Orivesi	4
Do.	do.	Scanmining	Pahtavaara Mine near Sodankyla	3
Metal	do.	Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Pori	4
Limestone		Partek Nordkalk Oy (Partek Corp., 100%)	Mines at Lappeenranta, Pargas, and Parainen	1,500
Do.		Rauma-Repola Oy	Mine at Tornio	300
Mercury	metric tons	Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Kokkola	150
Mica		Kemira Oyj (Government, 98%)	Mine at Siilinjarvi	10
Do.		Minelco Oy	Plant at Siilinjarvi	10
Nickel:				
Ore, Ni content		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Mine at Hitura	3
Metal		do.	Smelter at Harjavalta	32
Do.		OM Group, Inc.	Refinery at Harjavalta	50
Petroleum products	thousand barrels per day	Fortum Oil and Gas Oy	Plants at Naantali and Porvoo	250
Phosphate-apatite		Kemira GrowHow Oyj (Yara International ASA)	Mine at Siilinjarvi	850
Do.		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Mine at Pyhasalmi	800
Quartz and quartzite		SP Minerals Oy (Partek Corp., 50.1%, and SCR-Silbeco SA, 49.9%)	Mines at Kemio and Nilsia	250
Selenium	metric tons	Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Pori	35
Silver	do.	do.	do.	30
Steel:				
Crude		Rautaruukki Oy (Government, 41.8%)	Plants at Halikko, Hameenlinna, Kankaanpaa, and Raahe	2,100
Do.		Fundia AB (Norsk Jenverk AS of Norway, 50%, and Rautaruukki, 50%)	Plants at Aminnefors, Dalsbruk, and Koverhar	850
Do.		Ovako Oy (AB SKF, 50%; Wartsila Corp., 25%; Fiskas, 20%)	Plant at Imatra	600
Stainless		AvestaPolarit	Plant at Tornio	550
Talc		Mondo Minerals Oy (BHP Billiton plc, 50%, and Plüss-Staufer AG, 50%)	Mines at Lahnaslampi, Lipsavaara, and Horsmanaho	500
Wollastonite		Partek Minerals Oy (Partek Corp., 100%)	Mine at Lappeenranta	30
Zinc:				
Ore, Zn content		Inmet Mining Corp.	Mine at Pyhasalmi	25
Metal		Outokumpu Oyj (Government, 40%, and private investors, 12.3%)	Smelter at Kokkola	260

Do., do. Ditto.

THE MINERAL INDUSTRY OF FRANCE

By Alberto Alexander Perez

During 2007, France was a major player in the world economy and its gross domestic product (GDP) of $2,562 trillion was the third largest in the European Union (EU) after Germany and the United Kingdom. In 2007, France's GDP increased at a rate of 2.1% compared with a rate of growth in 2006 of 2.4%. The output value of France's entire industrial sector accounted for about 20.3% of the GDP. The country was a major processor of raw mineral materials and a manufacturer of industrial and consumer durable goods. France's heavy industries, which, among other product categories, produced automotive and aviation products, chemicals, and machine tools for domestic consumption and export, relied mainly on imported metal ores and concentrates, and on imported industrial minerals and mineral fuels (U.S. Central Intelligence Agency, 2007, p. 205).

Minerals in the National Economy

Owing to the size and structure of France's economy, the upstream input of minerals was key to continued maintenance and growth of the country's heavy industries. In 2007, the value of crude material imports alone, which included ores and concentrates of metals and industrial minerals, base metals, and mineral fuels, remained at levels similar to those of 2006, and amounted to almost 3% of the GDP (Eurostat, 2007, p. 1, 5).

Government Policies and Programs

A central theme in the runup to France's presidential elections in May 2007 was that of increasing the share of private capital and the role of private investment in the industrial sector, including in such Government-controlled industries as energy. The privatization or deregulation of key industries and the liberalization of the labor laws to increase national productivity was also a hotly debated issue. The Government of France continued to lessen its involvement in the country's economy in 2007. However, the Government still maintained total ownership of the Postal Service, including the Postal Service's banking and depository functions. The Société Nationale des Chemins de Fer Français (SNCF), which was the national rail company, remained firmly in control of the state in all its operations (rail, cargo and service) as well as the other main mass transportation services. The Government's total ownership of the country's natural gas and electricity production and distribution facilities ended with stock sales in 2005 and 2006. Earlier denationalization programs included the partial privatization of the country's automobile manufacturing and highway (toll-road) companies. The reduction of the Government's role in the economy was aimed at raising the competitiveness of and investment in France's economy; this policy was stimulated, in part, by the adoption of the Eurozone euro (€), which increased competitive pressure on French companies (U.S. Department of Commerce, 2007a, b).

The Ministry of Ecology and Sustainable Development was responsible for overseeing and regulating such environmental issues as agricultural runoff; air pollution from industrial and vehicle emissions; forest damage from acidic rain; and the potential for water pollution from mineral processing, mining, and urban waste. To promote innovation and the assimilation of new technologies for sustainable commercial growth and development through public funding, the Government created the National Agency for Industrial Innovation (NAII) in June 2005. In 2006, the NAII allocated about €337 million ($445 million)[1] for research on technologies aimed at increasing energy efficiency, reducing CO_2 emissions, and raising the output of renewable raw materials. Research on sustainable mining and quarrying practices to assist municipalities in securing biodiversity, land, and water resources would be undertaken in France's Mediterranean region, at Crau/Camargue in the Rhone Delta, and in the vicinity of Marseille (Bio Intelligence Service SAS, 2006; Euro-Roc, 2007).

Production

In 2007, France's reported nickel output increased by 19.7%, which continued the growth trend in production. Hot-rolled steel production decreased by 14.9% compared with the production level in 2006 whereas crude steel production decreased only slightly. The production of zinc decreased by 4.2% from the previous year, and the production of secondary lead decreased by 12.2% (table 1).

Major changes in the industrial minerals sector included sharp drops in the output of barite and fluorspar owing to mine closures in 2006. Also notable was an increase in ammonia (nitrogen) production and slight increases in the production of chalk and pumice. The production of salt decreased to 6.14 million metric tons (Mt) in 2007, which was about the level produced in 2005 (table 1). Crude oil production decreased slightly (Eurostat, 2007).

Mineral Trade

Most of France's demand for fuel and nonfuel mineral raw materials was met by imports. France's imports of nonfuel industrial materials, which included ores and concentrates of metals and industrial minerals, remained at about 2% of total imports, or $547 billion, in 2006 (the latest year for which data were available). Imports in this category from outside the EU were about 19% greater in value than those from EU member countries. The major commercial partners of France were all members of the EU, and included Belgium, Germany, Italy, and Spain. The leading non-EU commercial partner of France was the United States; trade between the two countries totaled $18.2 billion.

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[1] Where necessary, values have been converted from Eurozone euros (€) to U.S. dollars (US$) at annual average exchange rate of €0.731=US$1.00.

The leading component of France's mineral trade in 2006 was net imports of mineral fuels, which constituted about 10.3% of the value of total imports. France's imports of all goods from the Commonwealth of Independent States (CIS), which included a major natural gas and petroleum component, were valued at more than $17 billion in 2006; France had a negative trade balance with the CIS of about $8.5 billion. France's total imports from Russia alone were valued at more than $12.4 billion in 2006, and the country's negative trade balance with Russia amounted to more than $6.2 billion. The CIS was the main supplier of crude oil to France in 2007 and accounted for 29.6% of the total French crude oil imports. Petroleum imports from within the EU were mainly from Norway and the United Kingdom, which together accounted for 22.3% of France's crude petroleum imports in 2007. France's imports of natural gas from the CIS decreased by 14%, and those from Norway increased by 4%. Algeria, the Netherlands, and Norway together accounted for 67.4% of France's natural gas imports in 2007. Outside the EU, Russia accounted for more than 13% of France's imports of natural gas (Euro-Roc, 2007; Gambini, 2007; U.S. Energy Information Administration, 2007; Institut National de la Statistique et des Études Économiques, 2009).

Structure of the Mineral Industry

Although France continued to maintain state monopolies in a number of sectors of the economy, state ownership of the mineral sector had substantially diminished by 2006, and the mineral industry was increasingly a target for privatization in 2007. As noted earlier, the Government maintained partial ownership of the country's electricity generating and natural gas production and distribution facilities. Table 2 provides data on major French-owned enterprises that produced metals, industrial minerals, and mineral fuels in 2007.

Commodity Review

Metals

Aluminum.—In 2007, France's total output of alumina more than doubled compared with the amount produced in 2006; however, primary production of aluminum metal decreased slightly and secondary production remained at the same level as that of 2006 (table 1). France's Aluminium Pechiney S.A., which was owned by Rio Tinto Alcan Inc. (Alcan), was the country's sole producer of primary aluminum. Alcan also operated facilities for the production of alumina and aluminum semimanufactures. The planned closure of the Lannemezan smelter, which was scheduled for 2008, was based mainly on the expiration of long-term energy contracts and increasing energy costs (Alcan Inc., 2005, 2006b).

Alcan invested $70 million in 2007 for research and development (R&D) on smelter technology at the company's R&D facilities at Rhone-Alpes. Additional investment by Alcan included a planned outlay of about $9.5 million for the modernization of the continuous annealing and quenching line for automotive sheet and $15 million for new aluminum can splitting and trimming facilities at Neuf Brisach (Alcan Inc., 2006a, c, d).

Iron and Steel.—France's output of pig iron and crude steel decreased to levels similar to those of 2005, with the exception of hot-rolled steel production, which dropped to 14.8 Mt in 2007 from 17.4 Mt in 2006 and 16.5 Mt in 2005 (table 1). Crude steel consumption increased by 6.6% in 2007 and the change averaged an increase of slightly more than 1.16 million metric tons per year (Mt/yr). The consumption of finished steel averaged 17.8 Mt/yr in 2007.

Lead and Zinc.—In 2007, France's production of secondary lead declined by 12.2% compared with that of 2006 whereas primary lead production remained at the same level; total production of all refined lead for the year was 92,000 metric tons (t). Total zinc metal production in 2007 amounted to 115,000 t, which was a decrease of 4.2% compared with output in 2006. France's consumption of lead increased by about 6,000 t, whereas zinc consumption decreased by about 3.5%. On average, lead and zinc consumption decreased during the 2005-07 period; the decrease was attributable, in part, to price increases of about 30% and 33% for lead and zinc, respectively, compared with 2005 prices. These price increases stemmed largely from continued growth in China's metals consumption and insufficient worldwide mine production capacity—a situation that continued in 2007 (table 1; Metaleurop, 2007; World Bureau of Metal Statistics, 2007, p. 90, 137; International Lead and Zinc Study Group, 2009).

Industrial Minerals

France produced a broad variety of industrial minerals. In 2007, Imerys S.A., which was a major French producer of industrial minerals, mined and processed ball clays, carbonates, feldspar, and red clays domestically and from deposits in such countries as China, Germany, Spain, the United States, and Vietnam for domestic use and export (Imerys S.A., 2007, p. 8, 121).

Cement.—France's principal cement manufacturers were Lafarge S.A. and Société des Ciment Français (Ciments Français), which was a subsidiary of Italcementi S.p.A of Italy. In addition to their cement-producing facilities in France, both companies had major capital assets abroad. The other important producers of cement in France were the Vicat Group, which had five plants with a total cement production capacity of 6 Mt/yr, and Ciments d'Origny, which had six plants and a total cement production capacity of 4.2 Mt/yr. In 2007, Lafarge finished construction of its 300,000-metric-ton-per-year-capacity slag crushing plant at Bassens. The plant delivered crushed slag by land and sea to cement plants at Deux-Severes and Haute Garonne (International Cement Review, 2003, p. 147; PR Newswire Europe Ltd., 2006; Lafarge S.A., 2009).

Mineral Fuels and Other Sources of Energy

Of the total amount of primary energy consumed by France in 2007, 23.11% was electricity generated by hydraulic, photovoltaic, thermal electric, and wind power facilities. Nuclear energy accounted for 76% of total energy production, or the equivalent of 418.6 tetrawatthours (Tkh). Total primary energy consumption in 2006 (the latest year for which data were available) reached 275.3 Mt of petroleum equivalent, which was a slight (0.3%) decrease compared with that of 2005. The production of electricity amounted to 544.4 terawatthours (TWh). Thermal-electric power generated 58.3 TWh, and hydroelectric, wind, and photovoltaic power installations accounted for 67.4 TWh (Institut National de la Statistique et des Études Économiques, 2009).

Coal.—Domestic coal production ceased in 2005; this loss was compensated for mainly by imports of solid mineral fuels. Australia, Colombia, the EU, South Africa, and the United States were the leading suppliers of coal to France. Owing to rising energy prices, state-owned coal producer Charbonnages de France was considering reopening coal mines (provided that strict clean coal technologies were used). Some discussion centered on the construction of a coal mine–thermal electric power-generating complex at Lucenay-les-Aix in central Burgundy. Reportedly, the proposed complex would rely on 70 Mt of coal reserves and supply feedstock to a 1,000-megawatt electric power station (Carlisle, 2006; Direction Générale de l'Énergie et des Matières Premières, 2007, p. 7).

Natural Gas and Petroleum.—In 2007, France's domestic production of petroleum decreased compared with the output in 2006. Production of liquefied petroleum gas decreased by about 7.6%, which continued the trend of a substantial production decline since 2005 that stemmed from facility downtime for scheduled 5-year maintenance at the Lacq gasfield and processing facility. Domestic petroleum production declined by about 7.7% compared with that of 2006 (Institut National de la Statistique et des Études Économiques, 2009).

The privatization of Gaz de France and its merger with the Belgian-French Suez Group was among the main developments in the energy sector in 2006 and had continued repercussions in 2007. The privatization and merger received the approval of the European Commision and the French Government. The agreement called for the reduction of the Government's stake in Gaz de France to 34% from about 80% and the divestiture of several gas and electricity distribution subsidiaries by each of the merging parties. In 2007, French oil company Total S.A. recorded the highest profits ever for a French company ($8.8 billion), this mostly owing to the increased price of petroleum (France 24, 2008).

Nuclear Energy.—In 2007, nuclear energy accounted for 76% (418.6 TWh) of total electric power, which was a slight decrease (-0.3%) compared with that of 2006. At yearend 2006, the EU and a consortium of countries that included China, India, Russia, and the United States reached an agreement to build an experimental $5.77 million fusion reactor at Cadarche in France; in 2007, construction continued as planned (Platts, 2006; Direction Générale de l'Ènergie et des Matierès Premierès, 2007, p. 9).

Outlook

France is expected to continue to rely on imported mineral raw materials, including mineral fuels, to produce consumer and producer durables and such intermediate products as construction materials, and chemicals, and ferrous and nonferrous metals and semimanufactures.

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TABLE 1
FRANCE: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007[e]
METALS						
Aluminum:						
Bauxite, gross weight[3]	thousand metric tons	168	160	168 [e]	168	160
Alumina, metallurgical, gross weight[e, 3]	do.	300	300	200	200	500
Metal:						
Primary	do.	445	451	442	442	428
Secondary	do.	240	236	222	222	222
Antimony, metal, including regulus[e]		500	500	500	500	500
Cadmium metal		120	100	100	100	50
Cobalt, metal:						
Powder[e]		500	500	500	500	500
Chloride		181	199 [r]	280 [r]	256 [r]	305
Gold, mine output, Au content	kilograms	1,470	1,312	1,500 [e]	1,500	1,500
Iron and steel:						
Metal:						
Pig iron	thousand metric tons	12,756	13,198	12,705	13,013	12,425 [4]
Ferroalloys, electric furnace:[e]						
Ferromanganese	do.	120	106	105	105	105
Ferrosilicon	do.	100	87	100	100	100
Silicomanganese	do.	107	64	65	60	60
Silicon metal	do.	75	75	75	85	85
Other	do.	65	65	65	60	60
Total	do.	467	397	415	410	410
Steel:						
Crude	do.	19,803	20,770	19,481	19,857	19,252 [4]
Hot-rolled	do.	18,400	17,376	16,566	17,437	14,830 [4]
Lead, refined:						
Primary		1,535	--	--	4,039	4,000
Secondary		96,155	105,600	104,979	100,195	88,000
Total		97,690	105,600	104,979	104,234	92,000
Nickel, refinery products, Ni content[5]		11,138	12,103	12,536	13,700	16,400
Silver:[e]						
Mine output, Ag content	kilograms	495	682	700	700	700
Metal, Ag content of final smelter products	do.	400	400	400	400	400
Tin, secondary[e]		1,500 [4]	1,500	1,500	1,500	1,500
Zinc metal, including slab and secondary		268,408	267,528	210,000	120,000	115,000 [4]
INDUSTRIAL MINERALS						
Abrasives, undifferentiated[e]		300	300	300	272	272
Barite, $BaSO_4$ equivalent[e]		81,000	82,000	82,000	30,000	--
Cement, hydraulic	thousand metric tons	19,660	20,960	21,277	21,000 [e]	22,300
Clays:						
Kaolin and kaolinitic clay (marketable)	do.	323	316	293	300 [e]	307
Refractory clay, unspecified[e]	do.	15	15	15	15	15
Diamond, synthetic, industrial[e]	thousand carats	3,600	3,600	3,600	3,600	3,600
Diatomite[e]	thousand metric tons	80	75	75	75	75
Feldspar, crude	do.	671	628	651	650 [e]	650
Fluorspar, marketable	do.	89	90	53	40 [e]	--
Gypsum and anhydrite, crude[e]	do.	3,500	3,500	3,500	3,500	3,500
Kyanite, andalusite, related materials[e]	do.	65	65	65	65	65
Lime, quick and hydrated, dead-burned dolomite[e]	do.	3,500	3,600	3,400	3,500	4,000
Mica[e]		18,000	19,000	20,000	20,000	20,000
Nitrogen, N content of ammonia	thousand metric tons	1,153	1,120	1,206	616 [e]	800
Pigments, mineral, natural, iron oxide[e]		1,000	1,000	1,000	1,000	1,000
Phosphates, Thomas slag[e]	thousand metric tons	50	50	50	50	50
Pumice and other natural abrasives	do.	400	400	400	272	276

See footnotes at end of table.

TABLE 1—Continued
FRANCE: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007[e]
INDUSTRIAL MINERALS—Continued						
Salt, all sources	thousand metric tons	6,673	6,910	6,730	9,371	6,140
Sodium compounds:[e]						
Soda ash	do.	1,000	1,000	1,000	1,000	1,000
Sodium sulfate	do.	120	120	120	120	120
Stone, sand and gravel:[e]						
Chalk	do.	700	700	673 [4]	554 [4]	583
Dolomite, crude	do.	1,000	1,000	974 [4]	991 [4]	984
Granite, crude	do.	300	300	255 [4]	245 [4]	373
Limestone, agricultural and industrial	do.	12,000	12,000	11,590 [4]	11,018 [4]	11,699 [4]
Marble and travertine, crude	do.	200	200	121 [4]	130 [4]	148
Sandstone	do.	35	35	33 [4]	32 [4]	95
Slate, crude		5,000	5,000	5,390	5,703 [4]	8,716 [4]
Sand and gravel:						
Industrial sands		5,089 [4]	5,242 [4]	5,200	5,200	5,200
Other sand, gravel, and aggregates		160,884 [4]	163,404 [4]	165,000	165,000	165,000
Sulfur, all sources		1,012	965	616	650 [e]	650
Talc, crude	thousand metric tons	394	402	416	420 [e]	420
MINERAL FUELS AND RELATED MATERIALS						
Asphaltic material[e]		20,000	20,000	20,000	20,000	20,000
Carbon black[e]		200,000	200,000	200,000	200,000	200,000
Coal, including briquets:						
Anthracite and bituminous	thousand metric tons	1,730	160	--	--	--
Lignite	do.	9	--	--	--	--
Total	do.	1,739	160	--	--	--
Briquets[e]	do.	175	100	100	100	100
Coke, metallurgical	do.	4,601	4,616	4,500 [e]	4,500 [e]	4,500
Gas, natural, marketed	million cubic meters	1,520	1,330	1,100 [e]	1,200 [e]	1,200
Petroleum:						
Crude	thousand 42-gallon barrels	9,150	8,550	7,775	7,604	7,020
Refinery products:						
Liquefied petroleum gas	do.	33,617	32,000	32,000	30,000	27,715 [4]
Gasoline, all kinds	do.	143,263	140,000	140,000	140,000	132,264 [4]
Kerosene and jet fuel	do.	41,356	42,000	42,000	45,000	45,000
Distillate fuel oil	do.	261,340	250,000	250,000	250,000	250,000
Residual fuel oil	do.	70,847	72,594	72,600	70,000	70,000
Other products[e]	do.	127,166 [4]	129,000 [4]	129,000	130,000	130,000
Refinery fuel	do.	34,419	35,000	35,000	35,000	35,000
Total	do.	712,008	700,594	701,000	700,000	690,000

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through March 31, 2009.

[2] In addition to the commodities listed, France produces germanium from domestic ores, but actual output is not regularly reported.

[3] Reprocessed bauxite not for metallurgical use.

[4] Reported figure.

[5] Excludes secondary production from nickel/cadmium batteries.

TABLE 2
FRANCE: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina, metallurgical	Aluminium Pechiney (Alcan Inc., 97.95%)	Plant at Gardanne	200
Aluminum	do.	Aluminum smelters at:	
Do.	do.	Saint-Jean-de-Maurienne, Savoie Province	120
Do.	do.	Nogueres, Pyrenees, Atlantiques Province	115
Do.	do.	Lannemezan, Hautes-Pyrenees Province	63
Do.	do.	Auzat, Arieege Province (closed)	50
Do.	Aluminium Dunkerque (Alcan Inc., 97.95%)	Dunkerque, Calais du Nord	250
Andalusite	Denain-Anzin Minéraux Réfractaire Céramique	Glomel Mine, Brittany	75
Antimony, metal	Produits Chimiques de Lucette	Plant at Le Genest, Mayeene Province	15
Barite	Barytine de Chaillac	Mine and plant at Chaillac, Indre Province	150
Do.	Société Industrielle du Centre	Mine at Rossigno, Indre Province	100
Cadmium metric tons	Compagnie Royale Asturienne des Mines	Plant at D'Auby-les-Douai, Nord Province	200
Cement	Four companies, the largest of which are:	80 plants, including:	26,700
Do.	LaFarge S.A.	13 plants; largest at St. Pierre-la-Cour	9,500
Do.	Société des Ciment Français	13 plants; largest at Gargenville	7,000
Clay, kaolin	La Source Compagnie Minière	Kaolin d'Arvor Mine, Quessoy	300
Coal	Charbonnages de France (CdF), including:		
Do.	Centre-Midi Bassin	Open pit mines (closed)	1,000
Do.	Lorraine Bassin	Underground mines (closed)	2,500
Cobalt, metal metric tons	Société Métallurgique le Nickel (SLN)	Plant at Sandouville, near Le Havre	600
Copper, metal	Compagnie Générale d'Électrolyse du Palais	Electrolytic plant at Palais-sur-Vienne	45
Do.	Société Française d'Affinage du Cuivre	Smelter at Poissy, Yvelines	11
Diatomite	Ceca S.A.	Mines and plants at Riom-les-Montagnne and St. Bauzille	100
Feldspar	Denain-Anzin Mineraux S.A. (Imerys Group)	Mine and plant at St. Chely d'Apcher	55
Ferroalloys	Comilog International	Plant at Boulogne-sur-Mer	500
Do.	Société du Ferromanganese de Paris, Outreau	do.	420
Do.	FerroPem (Ferroatlantica)	Plants at Bellegarde, Laudun, and Marignac	400
Fluorspar	Société Génerale de Recherches et d'Exploitation Minières (Alcan Inc.)	Mines in southern France	150
Gold kilograms	Mines d'Or de Salsigne (Eltin Co., 51%; Ranger Co., 18%; Peter Hambro Plc., 10%)	Salsigne Mine near Carcassonne (closed)	3,000
Gypsum	S.A. de Matériel de Construction	Mine at Taverny	1,500
Iron and steel, steel	Sollac Atlantique S.A. (Acelor Group)	Dunkerque	6,700
Do.	do.	Fos-sur-Mer	4,200
Do.	do.	Florange	3,200
Do.	Sollac Unimetal (Usinor Group, 100%)	Gadrange, Neuves Maisons, and Thonville	8,400
Lead, metal	Metaleurop Nord (Metaleurop S.A.)	Plant at Noyelles Godault (closed)	165
Magnesium, metal	FerroPem	Plant at Marignac (closed)	15
Mica	Denain-Anzin Minéraux S.A. (Imerys Group)	Mine at Ploemeur, Brittany	160
Natural gas million cubic meters	Société Nationale Elf Aquitaine (SNEA)	Gasfield and plant at Lacq	20,000
Nickel, metal	Société Métallurgia le Nickel (SLN)	Plant at Sandouville	16
Nitrogen, N content of ammonia	Grande Paroisse S.A.	Plant at Grandpuits	390
Petroleum:			
Crude 42-gallon barrels per day	Société National Elf Aquitaine (SNEA)	Paris Basin oilfields	1,000
Refined do.	Total S.A.	Refineries at Gonfreville and La Mede	446,000
Do.	Shell-Française	Refinery at Petite Couron	285,000
Do.	do.	Refinery at Berre	270,000
Do.	Société Nationale Elf Aquitaine (SNEA)	Refinery at Feyzin	120,000
Do.	do.	Refinery at Donges	200,000
Do.	do.	Refinery at Grandpuits	96,000
Do.	Société Française British Petroleum (S.F.B.P.)	Refineries at Lavera	175,000
Do.	Esso S.A.	Refineries at Fos-sur-Mer	237,000
Do.	Mobil Oil Française	Refineries at Gravenchon	62,000
Do.	Cie. Rhenane de Raffinage (CRR)	Refinery at Reichstett	80,000

See footnote at end of table.

TABLE 2—Continued

FRANCE: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Potash, K_2O		Mines de Potasse d'Alsace S.A. (MDPA)	Amelie and Marie-Louise mines in Alsace (closed)	2,500
Salt		Compagnie des Salins du Midi et des Salines de l'Est (Salins Group)	Mines and plants at Algues Mortes, Dax, Salin de Girad, and Varangeville	2,500
Sulfur		Société Nationale Elf Aquitaine (SNEA)	Byproduct from natural gas, Lacq plant	3,000
Talc		Talc de Luzenac S.A. (Rio Tinto Corp., 100%)	Trimouns Mine near Ariege, Pyrenees	350
Uranium, U_3O_8	metric tons	Compagnie Général des Matières Nucléaires (Areva S.A.)	Mines at Limousin, Vendee, and Herault (closed)	1,800
Zinc, metal		Umicore Group	Plants at Auby-les-Douai and Calais	220
Do.		Metaleurop Nord (Metaleurop S.A.)	Plant at Noyelles Godault (closed)	110

Do., do. Ditto.

THE MINERAL INDUSTRY OF GEORGIA

By Richard M. Levine and Glenn J. Wallace

During the Soviet period, a range of mineral commodities were mined in Georgia, including arsenic, barite, bentonite, coal, copper, diatomite, lead, manganese, zeolite, and zinc, among others. The country had been a major producer of high-grade manganese ore for about a century, and ore reserves were significantly depleted. Part of the manganese was used within Georgia for ferroalloys production. Following the dissolution of the Soviet Union, there was a steep decline in mineral production.

Georgia's main role in the world mineral supply was serving as a transport route for oil and gas shipments out of the Caspian region to world markets. Three of the new large oil and gas export pipelines that had been or were being constructed in the Caspian region pass through Georgia. These include the Baku-Tbilisi-Ceyhan (BTC) oil transport pipeline, the Baku-Tbilisi-Erzurum (BTE) gas transport pipeline (also called the South Caucasus pipeline), and the Baku-Supsa pipeline (also called the Western Early Oil Route pipeline). In 2007, Georgia imported more than 70% of the energy it consumed (Transparency International of Georgia, 2008).

In 2006, the price that Georgia paid for Russian gas more than doubled. The Government of Georgia initiated a process to allow companies that were large gas consumers to conduct direct negotiations to import gas from Russia, but these companies were unsuccessful in negotiating to supply the Georgian energy market with cheaper Russian gas. In response, the Government of Georgia started searching for alternative gas supplies, particularly from Azerbaijan and Turkey (Alkhazashvili, 2007; Georgia Today, 2008).

In 2007, the State Oil Company of the Republic of Azerbaijan (SOCAR) delivered about 475,000 cubic meters of natural gas to Georgia. Georgia was attempting to obtain its entire 2008 requirements for gas, which would total about 1.5 billion cubic meters, from Azerbaijan (Alkhazashvili, 2007; Georgia Today, 2008). Georgia was able to obtain part of its gas supply from Azerbaijan because of an agreement executed in 2001 with the consortium that was developing the Shah Deniz offshore gas condensate deposit. The terms of the agreement specified that Georgia, as a transit state, would receive 5% of the gas transported from Shah Deniz along the pipelines through Georgia free of charge. In addition, Georgia had priority right to purchase about 500 million cubic meters per year of Shah Deniz gas at a prearranged discounted price. Azerbaijan began producing gas from Shah Deniz in early 2007 and began exporting Shah Deniz gas to Georgia in March 2007 (Georgia Today, 2008).

The main pipeline for Azerbaijan's natural gas exports is the BTE pipeline. It runs parallel to the BTC oil pipeline for most of its route before connecting with the Turkish gas pipeline network near the town of Horasan. In 2008, the BTE pipeline was expected to transport about 6.6 billion cubic meters of gas to Turkey, some of which would then be forwarded to Greece and Italy. The line was expected to reach its full capacity for transporting almost 20 billion cubic meters per year by about 2014 (Alexander's Gas & Oil Connections, 2003, 2006; Roberts, 2008).

In 2007, Georgia still received 60% of the gas that it consumed from Russia (Patsuria, 2008). Georgia received between 200 and 220 million cubic meters of gas from Russia's Gazprom as a transit fee for gas exported to Armenia from Russia through Georgia (Interfax Russia & CIS Oil and Gas Weekly, 2007a, b; Pasturia, 2008) .

In early 2007, SOCAR acquired the Kulevi oil terminal in Georgia. The terminal had the capacity to handle 10 million metric tons per year (Mt/yr) of oil. The oil would be transported by rail, then loaded onto tankers at Kulevi for shipment to European markets (Izmayilov, 2008).

Production

In 2007, production of most metals increased whereas production of most industrial minerals and mineral fuels was estimated to have remained stable. Production data for 2007 for most mineral commodities generally were not available at the time of the preparation of this report and the data in table 1 are estimated based on fragmentary information or general economic data.

Structure of the Mineral Industry

Georgia's main nonferrous and precious metals mining enterprise was the Madneuli mining and beneficiation complex that mined a large copper-gold and barite deposit. The Madneuli mining and beneficiation complex was transformed in 1994 into joint-stock company (JSC) Madneuli, in which the controlling interest belonged to the state. In 1997, a joint-venture Georgian-Australian enterprise, Quartzite Ltd., commissioned a gold recovery mill at the Madneuli deposit (World Investment News, 2008). In November 2005, JSC Madneuli was privatized; the tender awarded a 97% stake to Stanton Equities Corp., which was renamed GeoProMining Ltd. and which listed the location of its contact office as Moscow. Stanton Equity also acquired a stake in the Quartzite gold mill and received a 50% stake in Trans-Georgian Resources Ltd., which held the license to the Sakdrisi copper-gold deposit (Interfax Russia & CIS Metals and Mining Weekly, 2007; GeoProMining Ltd., 2008).

In February 2006, Stemcor UK Ltd., which was based in the United Kingdom, bought a 96% controlling stake in the Zestafoni ferroalloy plant. The Government of Georgia also privatized JSC Vartsikhe HEPS Cascade, a hydroelectric power plant that supplied power to Zestafoni, by selling it to Stemcor (Caucaz Europenews, 2008).

Commodity Review

Metals

Copper.—The Madneuli deposit is situated in the Bolnisi Region in the south of Georgia about 80 kilometers south of Tbilisi near the Armenian and Azerbaijan borders. Its main operations include mining and processing of copper and gold-bearing ore. GeoProMining (formerly JSC Madneuli) produced copper concentrate and gold as doré, which were sold according to standard international sales contract terms and based on prices quoted by the London Bullion Association and London Metal Exchange, Ltd.. In 2005 (the latest year for which the export data were available), the company's exports composed 8% of the total value of Georgia's exports (World Investment News, 2008).

GeoProMining was planning to construct a second copper concentrator in the village of Kazreti to process ore extracted from the Sakdrisi deposit. In addition, work was being conducted to construct a plant to process waste from the concentrator according to a contract signed with the country's Ministry of Environmental Protection and Natural Resources. The contract was negotiated within the framework of a memorandum on environmental protection that the company signed with the Ministry (Interfax Russia & CIS Metals and Mining Weekly, 2007).

Gold.—The Madneuli deposit reportedly contained 48 metric tons (t) of gold reserves. The Madneuli deposit had been mined by JSC Madneuli. In 1997, the Georgian-Australian enterprise Quartzite commissioned a gold recovery mill at the Madneuli deposit that employed heap leaching of gold-bearing secondary quartzite (World Investment News, 2008).

Although Georgia appeared to have potential resources for gold mining, it had not obtained the investment backing required to sustain a major mining venture. In 1995, the Georgian State Geology Committee announced that, based on Soviet records, the country had reserves of 8 million troy ounces (almost 250 t) of gold, and 48 million troy ounces (almost 1,500 t) of silver. A March 2007 report by the London based Hardman & Co. stated that Georgia had never been explored using market economy standards for evaluating reserves and, therefore, should be considered only highly prospective for precious metals. Soviet-era prospecting and geologic surveys did locate Georgia's gold deposits (Helmer, 2007).

The prospect of gold reserves attracted junior companies, the first of which was Bolnisi Gold Nl of Australia. Bolnisi, in partnership with JSC Madneuli, worked through Quartzite. In 1997, Bolnisi had said that the joint venture's indicated and inferred gold resource amounted to 780,000 troy ounces (24 t). In 2000, an extra 1 million metric tons (Mt) of ore was identified with a grade of 1.9 grams per metric ton (g/t) gold and 2.2 g/t silver. Bolnisi stated that between commencing gold production in 1997 and December 2005, Bonisi, in conjunction with JSC Madneuli, produced almost 483,000 troy ounces (15 t) of gold and 249,000 troy ounces (almost 8 t) of silver (Helmer, 2007).

A disagreement arose in 2000 between Bolnisi and JSC Madneuli when a representative of Quartzite made allegations against Bolnisi, which escalated into a dispute that had a severe effect on Bolnisi's activities in Georgia. Bolnisi eventually evacuated its expatriate managers; subsequently, prospecting stopped, gold output fell, and the cost of production rose sharply. Bolnisi's dispute with its Georgian partners eventually was partially resolved and production resumed, but at a much higher cost. In December 2005, Bolnisi announced that it had sold out its Georgian interests (Helmer, 2007).

Manganese.—For more than a century, Georgia had mined manganese ore from the Chiatura deposit. A portion of the ore was used to produce manganese ferroalloys at the Zestafoni ferroalloy plant. Stemcor owned the manganese mining enterprise Chiaturmanganumi, the Zestafoni ferroalloy plant, and the Vartsikhe hydroelectric powerplant, which were interlinked enterprises engaged in a full cycle of manganese ferroalloy production, from the mining of manganese ore to the production of manganese ferroalloys and the supply of power for these processes (Caucaz Europenews, 2008).

On January 5, 2007, the Minister of Economic Development of Georgia vested the certificate of ownership of Stemcor's holdings to Georgian Manganese Holding Limited LLC of the United Kingdom (a subsidiary of Stemcor). The new owner of the holding was obliged to invest $100 million within 2 years and to produce no less than 200,000 t of ore mined, which had to be processed in Georgia. To meet these requirements the company planned to purchase new furnaces for the Zestafoni plant. Production of ferroalloys was to reach at least 200,000 t in 2007 instead of the 120,000 t produced in 2006. In the long term, the annual production of ore was to increase to 700,000 t, and annual production of ferroalloys was to increase to 400,000 t (Ministry of Economic Development of Georgia, 2007).

Nine mines were operating at Chiaturmanganumi. When Georgia Manganese Holding acquired Chiaturmanganumi, it acquired a 40-year license to mine manganese ore at the Chiatura deposit. Chiaturmanganumi planned to restore operations at an additional six mines and to increase production of manganese concentrate in 2008 to 460,000 t compared with 350,000 t in 2007 (Interfax Financial & Business Report, 2006).

Georgian Manganese Holding stated that, because of reconstruction work on furnaces that began when the company started operation at the ferroalloy plant 15 months ago, the plant had increased production of ferroalloys to 15,000 metric tons per month (t/mo) from 10,000 t/mo. One additional furnace was scheduled to be renovated in 2008, and, as a result, production of ferroalloys was expected to increase to 170,000 t in 2008 compared with 120,000 t in 2007. Additional furnace renovations were planned for 2009 (Interfax Financial & Business Report, 2006).

Industrial Minerals

Nitrogen.—After many unsuccessful attempts at privatization, the Rustavi Azoti (Nitrogen) chemical plant had its ownership transferred to the Russian-Georgian business group JSC Energy Invest. Hundreds of millions of dollars worth of investments and a guaranteed supply of inexpensive natural gas were needed to renew the outdated technology of the Azoti works. If the technology is installed, major rehabilitation and training of personnel would also be necessary (Georgia Today, 2008).

Outlook

Production in the mineral industry of Georgia was reviving and the country could increase its production of copper, gold, manganese concentrates, ferroalloys, and other mineral products considerably. Georgia has been able to attract a limited number of foreign investors, and the future prospects for mineral development will depend, to some degree, on the country being able to attract additional foreign investment.

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TABLE 1
GEORGIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
METALS						
Copper, mine output, Cu content of concentrate[e]		14,700 [r]	12,000	10,000 [r]	9,000 [r]	11,000
Gold	kilograms	2,336 [r]	1,377 [r]	1,620 [e]	1,600 [r, e]	2,000
Iron and steel, ferroalloys, electric furnace:						
Ferromanganese		12,425 [r]	12,821 [r]	13,945	5,130	5,000
Silicomanganese		50,932 [r]	93,830 [r]	109,414	116,945	120,000
Total		63,357 [r]	106,651 [r]	123,359	122,075	125,000
Lead, mine output, Pb content[e]		400	400	400	400	400
Manganese ore, marketable:						
Gross weight		173,500	218,700	251,800	328,643	350,000 [2]
Mn content[e]		50,500	63,600	73,000	95,300	102,000
Silver[e]	kilograms	600 [r]	1,200 [r]	1,000 [r]	1,000 [r]	1,200
Zinc, mine output, Zn content of concentrate[e]		400	400	400	400	400
INDUSTRIAL MINERALS						
Barite[e]		NA	NA	NA	NA	NA
Cement		344,800	424,600	450,000 [e]	450,000 [e]	450,000
Clays, bentonite		9,700 [e]	1,800	7,876	4,487	5,000
Gypsum		8,507 [r]	1,707 [r]	238	123	125 [2]
Nitrogen, N content of ammonia		102,300	107,800	130,000 [e]	140,000 [e]	150,000
Perlite[e]		NA	45,000	45,000	45,000	45,000
Salt[e]		30,000	30,000	30,000	30,000	30,000
Zeolites		NA	NA	NA	NA	NA
MINERAL FUELS AND RELATED MATERIALS						
Coal, bituminous		8,000	8,000	5,100	8,284	8,280
Natural gas	thousand cubic meters	17,800	6,100	14,800	21,400	21,400
Petroleum:						
Crude		91,300 [r]	97,600	66,600 [r]	63,506	63,500
Refined		18,600	37,500	40,000	40,000 [e]	40,000

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. NA Not available.

[1] Table includes data available through February 28, 2009.

[2] Reported figure.

TABLE 2
GEORGIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Arsenic:	Deposits:	Locations:	2,000 [3]
As content of ore	Lukhumi deposit Tsani deposit	Ambrolauri region Lentekhi region	
Metal and compounds	Racha mining and chemical plant	Racha	NA
Do.	Tsana mining and chemical plant	Ts'ana	NA
Barite	Chordskoye deposit	Onis Raioni	70,000
Do.	NA	Madneuli deposit	NA
Barite-zinc	NA	Kvaisi deposit	NA
Bentonite	Gumbrskoye and Askanskoye deposits	Gumbra and Askana regions	200,000 [3]
Cement	Rust'avi cement plant	Rust'avi	1,500,000
Coal	Akhaltsikhe, Tkibuli-Shaorskoye, and Tkvarchelskoye deposits	Akhalts'ikhis Raioni, Tqibuli, and Tqvrach'eli regions	300,000 [3]
Copper, Cu content of ore	JSC Madneuli complex [GeoProMining Ltd., 97% (formerly Stanton Equity Corp.)]	Bolnisi region	12,000
Copper-gold	Trans-Georgian Resources [GeoProMining Ltd., 50% (formerly Stanton Equity Corp.)]	Sakdrisi deposit	NA
Diatomite	Kisatibskoye deposit	K'isat'ibi region	150,000
Ferroalloys:			
Ferromanganese	Zestafoni plant of Georgian Manganese Holding Limited LLC (Stemcor UK Ltd.)	Zestap'onis Raioni	100,000
Silicomanganese	do.	do.	250,000
Manganese sinter	do.	do.	250,000
Gold, mill	Quartzite Ltd. [GeoProMining Ltd., 97% (formerly Stanton Equity Corp.)]	Madneuli deposit	3
Iron ore	Hrazdan deposit	Sulagyan Mountains	NA
Do.	Tkibuli-Shaorskoye deposit	Tqibuli region	NA
Lead-zinc:			
Pb content of ore	NA	Kvaisi deposit	1,200
Zn content of ore	NA	do.	3,000
Manganese, marketable ore	Chiaturamanganumi enterprise of Georgian Manganese Holding Limited LLC (Stemcor UK Ltd.)	Chiat'ura-Sach'kheris field, Chiat'ura region	400,000
Nitrogen	JSC Azoti chemical plant (Energy-Invest)	Rust'avi	NA
Petroleum:			
Crude	Saknavtobi and most Georgian petroleum companies in joint ventures with Frontera Resources, Ioris Valley, Georgian British Oil Company (GBOC)-Ninotsminda, Anadarko, and GeoGeroil	About 60 wells that account for 98% of output in Mirzaani, Sup'sa, and Zemo T'elet'I regions	200,000 [3]
Refined	Batumi refinery (LLC Terminal)	Batumi region	NA
Do. 42-gallon barrels per day	Georgian American Oil Company (GAOR) refinery [CanArgo Energy Corp., 51%]	Sartichala	4,000
Steel, crude	Rust'avi steel mill [Energy and Industry Complex (a subsidiary of Thames Steel)]	Rust'avi	1,400,000

[e] Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

[1] Table includes data available through February 28, 2009.

[2] Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

[3] Capacity estimate is the total for all enterprises that produce that commodity.

THE MINERAL INDUSTRY OF GERMANY

By Steven T. Anderson

In 2007, Germany was a leading global exporter of industrial goods and services (including processed and fabricated mineral products). The country's mineral industry, however, depended almost entirely on imported mineral raw materials. Germany was the leading producer of lignite in the world, but domestic use of lignite accounted for only 11.6% of total primary energy consumption in the country. Germany was dependent on imports of other mineral fuels for almost all the remainder of its primary energy consumption; renewable energy resources, such as wind power, accounted for only about 1.5% of total energy consumption compared with 1% in 2006. In addition to imports of mineral fuels, Germany's metal processing sector relied on imports of metal ores and concentrates because no metals were mined in sufficient concentrations for domestic metallurgical use (Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 20-21, 31-32, 41-42, 197; Statistik der Kohlenwirtschaft e.V., 2008).

Germany either produced or was estimated to have produced greater than 1% of total world production of aluminum, barite, bentonite, cadmium (secondary), cement, diatomite, feldspar, gallium, gypsum, kaolin, crude iron, lime, magnesium compounds (as byproducts of potash mining), nitrogen (ammonia), potash, industrial quartz, salt (NaCl), silica (industrial sand and gravel), crude steel, and sulfur. Of these, the country was the leading mine producer in the European Union (EU) of barite, kaolin, potash, and salt. Germany was the second ranked producer of salt in the world (accounting for about 7.1% of global production), the third ranked producer of kaolin (8.9%), and the fourth ranked producer of potash (12%). The country was also a leading producer of bentonite, feldspar, and crude gypsum in the EU. Germany's domestic mineral processing sector accounted for at least 5% of the world's total production capacity of alumina, fused aluminum oxide (abrasive), graphite, magnesium metal (secondary), rhenium metal (byproduct), strontium compounds, and titanium dioxide pigments. The country was the leading producer of aluminum metal, refined copper, refined lead, and crude steel in the EU and accounted for approximately 1.4%, 3.7%, 4.4%, and 3.5% of the world's production of each of these metal commodities, respectively. Germany was also EU's second ranked producer of refined zinc metal (table 1; Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 23, 206, 217; Statistisches Bundesamt, 2008a, p. 110-111).

A person living in Germany is estimated to consume approximately 1,100 metric tons (t) of industrial minerals, metallic mineral raw materials, and mineral fuels during an average lifetime in the country. The international competitiveness of the country's nonfuel mineral processing and fabrication sectors relied primarily on such factors as a highly skilled labor force, rapid assimilation of new technology (especially metal and other mineral materials recycling technologies), and the development and maintenance of liberal trade relationships both within and outside of the EU, which officially expanded to 27 members at the end of 2006. Throughout the year, rising global demand for mineral fuels and associated price increases for imports of mineral fuels into Germany had a significant effect on the operating costs of the country's mineral industry. Additionally, rapid development of mineral processing operations in economically less-developed or lower-cost (for mineral extraction, processing, and transportation) regions of the world placed increased pressure on the mineral industry to minimize energy, labor, and material costs within the country (Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 19-23, 31-32, 37-38, 203; 208, 210, 212, 214, 218; U.S. Library of Congress, Federal Research Division, 2008, p. 11-12).

Minerals in the National Economy

In 2007, the output of the metal processing sector (up until the foundry stage of production) was valued at about \$117.5 billion[1] compared with \$87.43 billion in 2006, and these values accounted for 3.5% and 3.0% of the annual gross domestic product (GDP), respectively. Most of this increase was accounted for by an increase in price of the metals produced, relative to the average price of the rest of the goods and services produced in the German economy. The German Federal Statistics Office (DSTATiS)'s real (based upon prices in 2000) producer's price index for all of the metals and alloys produced in the country increased by about 7.1%. The cost of metals contained in ores and concentrates also increased, and Germany spent \$41 billion on imports of crude metallic mineral materials in 2007 compared with about \$34 billion in 2006. Domestic mine production of nonfuel industrial minerals (excluding manufactured products, such as cement) was valued at approximately \$10 billion in 2007 compared with \$9.2 billion in 2006, and the real producer's price index increased by 2.8% (Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 37-38; International Monetary Fund, 2008; Statistisches Bundesamt, 2008a, p. 9-10, 15).

Although an official value of domestic coal mine production was not readily available, an estimate can be obtained by using the annual average price per metric ton of coal equivalent (CE) contained in anthracite and bituminous (hard) coal and lignite. Using this method, the value of the country's production of lignite was approximately \$7.6 billion in 2007 compared with about \$6.2 billion in 2006. This increase in value was mostly owing to the price of steam coal (for electricity generation) increasing to \$93.53 per metric ton of CE compared with \$77.54 per metric ton of CE in 2006 in Germany, although the volume of domestic production of lignite also increased by about 2.3% during this timeframe. Thus, the value of production of hard coal was valued at about $2.06 billion in 2007 compared with $1.67 billion in 2006, and the annual production level also increased during this timeframe. According to these rough estimates, Germany's combined mine production of hard coal and lignite would account for less than 1% of the GDP. The estimated values of lignite production, however, could be substantially lower than what they would be if one used export values to construct the estimates. Additionally, domestic coal production helped satisfy the country's demand for primary energy (that is, energy generated by the combustion of mineral fuels and related materials, and by other sources, such as wind and water) and helped mitigate the high cost of importing or investing in the development of other primary energy sources. In 2007, combustion of hard coal products accounted for 14.3% of Germany's consumption of primary energy, and that of lignite products accounted for 11.6% (table 1; Statistik der Kohlenwirtschaft e.V., 2007, 2008; Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 9, 41-42, 237; International Monetary Fund, 2008; Statistisches Bundesamt, 2008b, p. 68).

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[1] Where necessary, values have been converted from European Union euros (€) to U.S. dollars (US\$) at an annual average exchange rate of €0.7964=US\$1.00 for 2006 and €0.7296=US\$1.00 for 2007. All values are nominal, at current prices, unless otherwise stated.

In addition to any contribution to the GDP, Germany's recycling industry is very important to the economy because it reduces the country's reliance on imports of mineral raw materials (especially of metallic minerals for the metal processing sector), helps safeguard the domestic supply, and promotes a sustainable supply of mineral raw materials. The recovery of metallic mineral raw materials exclusively from secondary sources (scrap metal) contributed about $4.1 billion to the GDP in 2007 compared with about $3.2 billion in 2006, and that of industrial mineral raw materials (including from mineral-rich slags and residues) was valued at about $1.3 billion in 2007 compared with $1 billion in 2006. DSTATiS's real producer's price index (base year = 2000) for all secondary metals and industrial minerals increased by about 11% during this same timeframe (57% since 2003). Adjusted for inflation (2.276% in Germany in 2007, based on consumer prices in 2000), the combined value of the country's total production of secondary metals and industrial minerals increased by about 26% in real terms. This is significantly greater than twice as much as the increase in the real producers price index for the same mineral materials during the same timeframe, and would appear to indicate that secondary production of these mineral materials increased substantially in 2007 compared with that in 2006 in Germany (International Monetary Fund, 2008; Statistisches Bundesamt, 2008a, p. 10, 17).

According to DSTATiS, approximately 1,260 metal-processing plants were operating in Germany in 2007, of which about 84 were focused exclusively on the recovery of metals from secondary sources. However, the Federal Ministry of Economics and Technology (BMWi) estimated that about 4,700 plants were operating in Germany and employed about 435,000 people, on average, during the year. The BMWi also reported that 23,202 people were employed in underground mining (17,447 of which mined hard coal), 14,733 people were employed in open pit mining and quarrying (of which 9,890 were employed in mining lignite), and an additional 43,083 people were employed above ground to provide full-time administrative, clerical, and logistical support for domestic mining operations at year's end (Bundesministerium für Wirtschaft und Technologie, 2008a, p. 78; 2008b; Statistisches Bundesamt, 2008a, p. 15, 17).

Government Policies and Programs

Germany's main mining law is the Federal Mining Act (BGBl. IS. 1310), which was approved on August 13, 1980, and revised on December 9, 2006, through slight revision to provisions of Article 11 (BGBl. IS. 2833). The 2006 revision did not appear to have much effect on the structure of the mineral industry in 2007. Of greater structural impact was the Government program to phase out the subsidy for the mining of hard coal. At the beginning of 2007, the Government confirmed a schedule to completely eliminate the subsidy by 2018. In 2007, the total amount of this subsidy was about $3.4 billion, and this amount was expected to be reduced to $2.9 billion by 2010. A Government review of the phaseout policy was scheduled for 2012, which coal mining interests in the country expected to represent the next possible date for approval of an extension of the 2018 deadline. Although these lobbying groups considered the probability of such an extension to be quite low, they believed that coal prices could increase substantially or that a global coal shortage could help create economic circumstances that would make it possible for industry to continue to mine hard coal from at least a few of the remaining mines in the country. It was also thought that private steel companies might help finance the mining of coking coal, even after the end of Government subsidies. Even if the Government decides to extend the subsidy slightly in 2012, and unexpected subsidies are obtained from other sectors, the maximum number of mines that might be expected to remain open beyond 2018 was three (Bundesministerium der Justiz, 2007, p. 1; Casteel, 2007, p. 4; Kirschbaum, 2007; Whitlock, 2007; Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 47; Bundesministerium für Wirtschaft und Technologie, 2008a, p. 9, 33-38, 48).

The Environmental Impact Assessment Act (EIA Act) (BGBl. IS. 1757, 2797), which was approved on June 25, 2005, and revised through slight changes to Article 2 (BGBl. IS. 3316) of the Act on December 21, 2006, was the environmental law that was most applicable to the mineral industry during 2007. This act incorporated provisions of an older ordinance concerning the assessment of environmental impacts for mining projects (BGBl. IS. 1420), which was approved on July 13, 1990, and revised through slight changes to Article 8 (BGBl. IS. 2819) on December 9, 2006; the Act also incorporated other older ordinances, such as one for the protection of groundwater against pollution caused by certain dangerous substances (BGBl. IS. 542), which was approved on March 18, 1997, and was still applicable to the use and disposal of many of the chemicals used in mining and mineral processing in Germany. The EIA Act requires environmental impact assessments for all domestic waste repositories created or used by the mineral industry. The Federal Mining Act actually stipulates how these repositories are to be constructed and operated (monitored) (Bandt and others, 2003; Bundesministerium der Justiz, 2007, p. 30; Bundesministerium für Wirtschaft und Technologie, 2008a, p. 34, 46-52).

In 2007, high prices for most minerals and a high import dependence on mineral raw materials led the European Commission (EC) to begin consideration of an EU raw materials initiative, but the first public consultation concerning this initiative was not expected until March 2008. The BMWi did not expect that the EU would have comprehensive European mining legislation; the BMWi believed, however, that many EU directives were already having (or could have) a direct effect on domestic implementation of German mining law. Some examples include the following:

- Directive 94/22/EC concerning the conditions for granting and using authorizations for the prospection, exploration, and production of hydrocarbons;
- Directive 92/91/EEC concerning the minimum requirements for improving the safety and health protection of workers in the mineral-extracting industries through drilling;
- Directive 92/104/EEC on the minimum requirements for improving the safety and health protection of workers in surface and underground mineral extracting industries; and
- A proposal for an EU directive on the management of waste from the extractive industries (Kullmann, 2007; Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 24-25).

On June 1, 2007, the EU's new Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) legislation was implemented. This new chemical control directive applies to many mine products, including imported mineral raw materials and waste materials from mining and mineral processing operations in Germany. The REACH legislation requires mineral producers to prove that these chemically complex substances should not be classified as hazardous materials by testing and registering all chemical contents of these materials (rather than leaving this task to EU regulators). REACH could allow classification of many industrial minerals and metals (including metals contained in scrap) as hazardous chemicals until proven otherwise by the producers. Along with other mineral industry representatives, German steel producers lobbied for scrap to no longer be classified as waste according to the European Waste Directive or defined as a hazardous material according to REACH (Baudier, 2007; Dillinger Hüttenwerke AG, 2007; O'Driscoll, 2007b; Weghuis, 2007).

The EU continued to implement its Emissions Trading Scheme to help fulfill its obligation to cut CO_2 emissions by 5% of their 1990 levels by 2012, according to terms of the Kyoto Protocol agreement. EU emissions of CO_2 are primarily from the combustion of mineral-based fuels. On February 9, 2007, Germany's Minister of the Environment announced that the Government had agreed with the EC to cap CO_2 emissions in the country at 453 million metric tons per year (Mt/yr) from 2008 through 2012, which was 11% lower than the cap for Germany from 2005 through 2007. During 2007, there were more permits than aggregate CO_2 emissions by companies, on average, in the EU, after a surplus of permits also occurred in both 2005 and 2006. The price of a permit to emit 1 t of CO_2 in the EU in 2007 was about $8.90 at the beginning of the year, and it decreased to about 3 cents by the end of the year. Although the price of a permit to emit 1 t of CO_2 in the EU in 2008 continued to average about $27 through the end of 2007, the German Government was considering EC amendments to the agreement that would result in a cap even lower than 453 Mt/yr of CO_2 for Germany during 2008 to 2012 (Benoit, 2007; Economist, The, 2007a; Kirschbaum and Taylor, 2007; Vereinigung Rohstoffe und Bergbau e.V., 2007, p. 29-30, 37, 40-42; Bundesministerium für Wirtschaft und Technologie, 2008a, p. 46-52; RWE Aktiengesellschaft, 2008, p. 46, 50).

In addition to being the leading lignite mining company in Germany, RWE Aktiengesellschaft was among the five leading utility companies in the EU. The carbon trading portion of the EU's carbon emissions cap and trade scheme allows such companies as RWE to sell permits (called European Union Allowances or EUAs) in the company's possession that are in excess of the metric tons of CO_2 emitted by that company. Although most EUAs appear to have been issued to the companies for free initially, they can be viewed by the company as an asset that can be sold for an immediate profit on the EU's carbon market. Thus, the market value of the EUAs turned into the EC (without compensation) for every metric ton of carbon emitted by the company can be viewed as an operating cost (equivalent to the potential company revenue that is foregone by not being able to sell the EUAs on the market). In 2007, RWE was under investigation by the German Federal Cartel Office (GFCO) for possibly overcharging the company's electricity customers enough to make up for between 50% and 100% (and even more than 100%, in some instances) of the market value of the EUAs that RWE had turned in to the EC for the company's emissions. Reportedly, the EC and the GFCO expected that they would not be able to limit oligopolistic utilities companies (such as RWE) from passing on up to one-quarter of the market value of EUAs surrendered back to the EC. The investigation of RWE appeared to be more aimed at determining how much the company may have used its market power to overcharge industrial customers for the purposes of generating an excess revenue to (more than) make up for potential revenue lost by not being able to sell EUAs on the open market. A settlement was reached in the case after RWE agreed to auction off (at bid prices) some of the electricity generated by its hard coal and lignite power plants (Eckert and Rotscheroth, 2007; RWE Aktiengesellschaft, 2008, p. 1, 25, 28).

Production

The estimated production of metallurgical alumina increased by about 18% compared with that of 2006, because of an expansion in production capacity by the only major producer in the country. Information was not available concerning the major cause of the substantial decrease in the expected secondary production of cadmium from recycled materials. Higher domestic processing costs combined with greater foreign processing capacity (at considerably lower costs) led to less processing of imported ores and concentrates to produce ferroalloys in Germany compared with that of 2006. In 2007, production of lead metal increased significantly compared with that of the previous year, mostly owing to improvements to both the primary and secondary circuits at the lead smelter and refinery at Nordenham at the end of 2006. Although reliable information concerning the production of platinum-group metals

(PGMs) in the country was not available, the major cause of the increase in production of PGMs was probably owing to greater recycling of catalytic converters compared with that of 2006 (table 1; Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 67, 69-70, 75-78, 91-92, 100-102; Recylex S.A., 2008, p. 7, 12-13, 24).

In 2007, production of bromine compounds increased substantially compared with that of 2006, at least partially owing to the increased availability of bromine-bearing bitterns as a byproduct of domestic potash mining. Magnesium compounds were also recovered as a byproduct of potash mining and production increased significantly. The production of bromine compounds may have increased so much more than that of either magnesium compounds or potash (in percentage terms) because of the much smaller production base for bromine and the possibility that the data for production of manufactured bromine compounds may include chemical plant production that is not closely related to domestic production of potash. The total marketable volume of potash mine output increased only slightly, but the percent of marketable byproduct (containing bromine and magnesium-bearing compounds, kieserite, and salts) in the total volume of marketable potash mine output increased to about 20% compared with a combined percent content of about 18% in 2006 (table 1; Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 217; K+S Aktiengesellschaft, 2008, p. 23-25).

Reported production of fire clay and chamotte increased by about 30%, but no information concerning the opening of any new mines compared with those identified as producing in 2006 was available. Thus, this increase was likely to have resulted from increased production at existing clay mines and quarries. Production of salt (NaCl) from all sources decreased substantially, at least partially in response to decreased demand for salt to be used in deicing compounds during a relatively mild winter across the EU. Production of dolomite and limestone as dimension stone decreased substantially (by 16%) and to a much greater extent than cement production (which decreased by approximately 1%) in Germany. One reason appears to be that proportionally less dolomite and limestone were input into cement manufacture owing to substitution of slag-based products, which led to substantially less mining of dolomite and limestone overall (table 1; ICR Research, 2008; K+S Aktiengesellschaft, 2008, p. 2, 31, 42, 45; Südwestdeutsche Salzwerke AG, 2008, p. 6-7).

After decreasing the number of hard coal mines to eight in 2006 compared with nine in 2005, no further mine closures took place in 2007 and production actually increased slightly, reversing a trend of decreasing annual production that had been ongoing since about 1999. Data concerning the production of coke oven gas was available from Statistik der Kohlenwirtschaft e.V., which enabled an update of the series in table 1 but still does not include production of coke oven gas by some private steel companies. In 2007, a project to clean up and remove radioactive material in and around the uranium mine sites of the former Soviet-German mining company WISMUT SDAG in the states of Saxony and Thuringia entered its 17th year but resulted in substantially less annual recovery of uranium, perhaps signaling that this lone source of uranium mine production in Germany is approaching complete closure. Because reliable figures were not available for production of natural ground calcium carbonate (GCC) that might be separate from production of limestone or natural chalk, an estimated level of GCC production is not included in table 1 to avoid possible double counting (table 1; Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 47, 51-52, 110; 2009, p. 211; Statistik der Kohlenwirtschaft e.V., 2008).

Structure of the Mineral Industry

The most notable changes to the structure of the mineral industry of Germany took place in the alumina and aluminum sectors. The most significant development was the reopening of Hamburger Aluminium-Werke GmbH (HAW) on May 9 by the primary aluminum smelter's new owner, Trimet Aluminium AG, and ramping up to full capacity of 133,000 metric tons per year (t/yr) of aluminum metal in December 2007. Together with Trimet's smelter near Essen, the restart of HAW meant that Trimet owned the capacity to be the leading producer of primary aluminum in Germany in 2008. Also in December 2007, Dubai International Capital LLC (based in Dubai) acquired the alumina refinery Almatis GmbH from Rhone Capital LLC (with bases in London, New York, and Paris). Novelis Inc. (based in Atlanta, Georgia) owned 50% of Aluminium Norf GmbH (AluNorf), which was reportedly the leading aluminum rolling and remelt plant in the world, and Novelis was acquired by Hindalco Industries Ltd. (of India) on May 16, 2007. In April 2007, Tata Steel Ltd. (of India) acquired Corus Group plc (of the United Kingdom), including the primary aluminum smelter operated by Corus Aluminium Voerde GmbH in Germany (Moores, 2009).

Since the closure of the last metal mines in 1992, there has been no mining of metallic minerals in Germany. However, many of the leading companies in the global metals processing sector owned and operated significant facilities in Germany. ArcelorMittal (based in Luxembourg) was the leading producer of crude steel in the world and the second ranked producer in Germany. The new company's name was changed, effective in 2007, following the acquisition of Arcelor S.A. (based in Luxembourg) by Mittal Steel Company NV (based in the Netherlands) on August 1, 2006. ThyssenKrupp AG (based in Duisburg, Germany) was the leading producer of crude steel in Germany and the second ranked producer in the EU. ThyssenKrupp was the 16th ranked producer of crude steel in the world. Norddeutsche Affinerie AG (based in Hamburg, Germany) was the third ranked producer of marketable copper metal in the world and the leading producer of secondary refined copper. The company was the leading producer of total refined copper in the EU. On July 16, 2007, the shareholders in Metaleurop S.A. of France approved a change in the company's name to Recylex S.A.; this company was the second ranked producer of lead metal in Germany and the third ranked producer in the world. Xstrata plc was a globally significant miner and producer of zinc metal, and the company owned the leading zinc smelter in Germany (table 2; ArcelorMittal, 2008, p. 2-4, 62; Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 77; Recylex S.A., 2008, p. 9, 26; Xstrata plc, 2008, p. 1, 86, 88, 97; World Steel Association, 2009, p. 8).

S&B Industrial Minerals S.A. (of Greece) was the leading producer of bentonite in the EU and the second ranked producer of bentonite in the world. The company was the leading producer of bentonite in Germany, and mined the country's leading bentonite deposits in the southeast corner of the country. S&B Industrial Minerals was also the leading producer of fluxes for continuous casting of crude steel in the world. In July 2007, S&B Industrial Minerals acquired a bentonite plant in Neuss, Germany, from OMYA GmbH (a wholly owned subsidiary of OMYA AG, which was based in Switzerland). S.C.R.- Sibelco NV (of Belgium) was the leading producer of kaolin, plastic (ball) clays, quartz, and silica (industrial) sand in the world; a subsidiary of Sibelco in Germany, WBB Fuchs GmbH & Co. KG, was the leading producer of kaolinitic clays in the country. Besides WBB Fuchs, many family-owned small and medium-scale enterprises (SMEs) produced ceramic, kaolinitic, and plastic (ball) clays in the Westerwald region of western Germany. HeidelbergCement AG (based in Heidelberg, Germany) was the leading producer of cement in the country and the fourth ranked producer in the world. Most of the leading private cement companies in the world also produced cement in Germany. K+S Aktiengesellschaft of Kassel, Germany, was the leading producer of potash and salt (NaCl) in the EU and the fourth ranked producer of potash in the world (table 2; Brodie, 2007; Industrial Minerals, 2007a; Arbeitsgemeinschaft Westerwald-Ton e.V., 2008; ICR Research, 2008; K+S Aktiengesellschaft, 2008, p. 23; S&B Industrial Minerals S.A., 2008, p. 1, 17).

RWE Power AG (based in Essen, Germany) accounted for about 55% of the total production of lignite in Germany, and about 89% of the company's lignite production was used to generate electricity domestically. RWE was the leading producer of electricity in Germany and the second ranked producer in the United Kingdom. About 92% of all the lignite produced in the country was used domestically to produce electricity (Bundesministerium für Wirtschaft und Technologie, 2008a, p. 8-14; RWE Aktiengesellschaft, 2008, p. 1, 80; Bundesanstalt für Geowissenschaften und Rohstoffe, 2009, p. 212).

Mineral Trade

Germany spent 4.34% of its nominal GDP (or about $144 billion) on imports of mineral commodities, including crude petroleum (about $55 billion), nonferrous metals (about $24 billion), natural gas ($21 billion), ferroalloys ($9.6 billion), precious metals and stones ($8.3 billion), iron and steel ($7.2 billion), coal (mostly anthracite and bituminous coal) (about $5.8 billion), other mineral fuels, including uranium (about $4.3 billion), and industrial minerals (about $2.2 billion). In current U.S. dollars, Germany's expenditures on imports of minerals increased significantly compared with about $133 billion in 2006 (although they actually decreased by about 1% in terms of euros during this same timeframe), and had increased quite substantially compared with the country's expenditures of $61 billion in 2003. In 2007, the balance of Germany's trade in raw mineral materials (excluding processed metal products, such as crude steel; manufactured products, such as cement; and petroleum refinery products) was approximately -$92 billion compared with about -$88 billion in 2006 (Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 12-13, 20-23, 37-38, 50; International Monetary Fund, 2008; Statistisches Bundesamt, 2008b, p. 59-60).

In 2007, Germany was a net exporter of crushed stone, gypsum, lignite, potash, salt (NaCl), sand and gravel, silica sand, some clays (but not kaolin), and sulfur and was a net importer of all other minerals used in the country (including imports of almost all metallic minerals used in crude form). Notable exports of industrial minerals were about 32 million metric tons (Mt) of crushed stone, sand and gravel; 3 Mt of potash; and 2.79 Mt of salt (NaCl). Germany exported about 8 Mt of cement and clinker and imported about 1.14 Mt of cement. Germany's trade in metals reflected its primary role in the global mineral industry as an importer of metallic ores and concentrates and an exporter and consumer of processed metal; even refined metals were mostly not exported but further used in German industrial production of automobiles, machinery, and other finished products. Notable processed metals of which Germany was a net exporter were gold metal [exported about 190 kilograms (kg) and imported 37 kg]; lead metal, refined and unalloyed (exported about 107,000 t and imported about 77 t); and silver metal (exported 1,877 t and imported 859 t). Notable processed metals of which Germany was a net importer were aluminum, unalloyed (imported about 786,500 t and exported 61,000 t); copper, refined and unalloyed (imported about 843,700 t and exported about 117,400 t); crude steel (imported about 35,000 t and exported about 4,600 t); ferroalloys (imported about 1.5 Mt and exported 162,500 t); palladium (imported about 49 t and exported about 22 t); platinum (imported 43 t and exported 25 t), and zinc metal, unalloyed (imported about 786,500 t and exported 61,000 t) (Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 12-13, 20-21, 67, 83-84, 91, 98, 100-102, 107, 110-111, 133, 135, 139, 142, 154).

Germany was basically self-sufficient in lignite but substantially import-dependent on other mineral fuels. The country exported about 910,000 t of lignite and imported about 150,000 t (mostly in the form of briquets). Germany imported about 107 Mt of crude petroleum and exported 28.1 Mt; imported 47.5 Mt of hard coal and exported about 130,000 t; and imported about 3,200 t of unenriched natural uranium (U content) and exported about 223 t. The country's net imports of natural gas totaled 75.8 billion cubic meters during the year. The only mineral fuel for which the United States was a significant importer from Germany was enriched uranium (Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 42-43, 45, 47-48, 50-51, 129-131).

Commodity Review

Metals

Aluminum.—In table 1, the estimated production of alumina in the first data series is based on the reported production capacity of metallurgical-grade alumina by a single producer in Germany. At least one report appears to indicate that this company produced closer to about 1 Mt in 2007, but more accurate information concerning an expansion of either production capacity or the annual level of production (if any) was unavailable (Doris Homberg, Bundesanstalt für Geowissenschaften und Rohstoffe, written commun., January 29, 2009). Table 1 also includes data reported by DSTATiS for production of aluminum hydroxide in the country, which may be processed to produce both metallurgical and nonmetallurgical alumina. Approximately seven companies produced aluminum hydroxide in Germany, including the company that produced alumina primarily for metallurgical uses. Reliable data concerning the exact proportion of the reported production of aluminum hydroxide that was further processed to produce metallurgical-grade alumina were not available. In addition, estimated secondary recovery of nonmetallurgical alumina from the salt slag that forms during the process of aluminum recycling is listed as an industrial mineral in table 1. The alumina that is recovered from this slag is mostly used as an additive to cement and in manufacturing mineral wool in Germany. The other most common uses of nonmetallurgical alumina in the country are in the manufacture of abrasives, ceramics, lubricants, or refractory materials (tables 1, 2; Aluminium, 2007; Statistisches Bundesamt, 2008a, p. 110; DADCO Alumina & Chemicals Ltd., undated).

In 2005, Alcoa Inc., Austria Metall AG, and Norsk Hydro ASA agreed to close their joint subsidiary HAW at the beginning of 2006, and it remained closed during the entire year. The partners then sold this primary aluminum smelter to Trimet Aluminium AG; the sale became effective on December 1, 2006. Trimet Aluminium ramped up production at HAW to full capacity (listed at 133,000 t/yr of aluminum) by the end of 2007. Norsk Hydro also closed its Elbewerk primary aluminum plant at Stade (formerly listed production capacity of 70,000 t/yr of aluminum) at the end of 2006 and reached an agreement to sell the plant site to two alternative energy systems companies. These companies reportedly converted the Elbewerk facilities into a combined heat and power station, a plant to produce bioethanol, and a plant to manufacture wind-turbine rotor blades. For this report, the Elbewerk site is no longer considered an aluminum plant and was removed from table 2.

Copper.—Norddeutsche Affinerie (NA) produced about 800,000 t/yr of refined copper and copper products in Germany, and the company was a significant producer (in Germany and in the EU) of various byproducts, including gold, PGMs, selenium, silver, and sulfuric acid. In 2007, the company produced 1,255 t of silver metal, 33 t of gold metal, and about 1.1 Mt of sulfuric acid. On average, the company obtained about 60% of the copper content of its products from imported concentrates and 40% from recycled materials. The company approved plans to expand its facilities in Hamburg to process copper concentrates, and expected to increase its processing capacity to 1.25 Mt/yr of copper concentrates by sometime in 2009 compared with 1.115 Mt/yr in 2007. In July 2007, the company completed construction of a pilot plant to produce strips for flexible copper-indium-selenium (CIS) solar cells, and began test production of solar cells that were constructed by applying a thin (2 millionths of a meter) CIS film on metal foil composed of copper, titanium, or stainless steel. Review of the results from the pilot plant was scheduled for the end of June 2008, and a full-scale plant for the production of flexible solar cells could be completed by sometime in 2010, if approved (Norddeutsche Affinerie AG, 2008, p. 2, 50, 56, 67, 73-74, 89, 105, 161).

Ferroalloys.—In 2007, production of ferroalloys from imported ores and concentrates in Germany was apparently limited to production of ferrochromium and ferromolybdenum. Other ferroalloys that may have been produced from scrap materials recovered in the country included ferromanganese, ferronickel, and ferrotungsten, but reliable information concerning production of ferroalloys was mostly unavailable. Germany was estimated to have imported about 154,000 t of chromium-bearing ores and concentrates compared with about 137,000 t in 2006, but the amount of ferrochrome produced in the country decreased substantially. Some imported chromite was processed for uses other than to produce ferrochrome in the country, including processing of about 30,000 t/yr of chromite by Mineralmahlwerk Hamm GmbH to produce mineral products for the foundry and refractory sectors. Kermas Ltd. (incorporated in the British Virgin Islands) had a controlling ownership interest in Samancor Chrome Ltd. (located in South Africa), which was one of the leading producers of chromite in the world. Kermas was also the 100% owner of Elektrowerk Weisweiler GmbH, which accounted for almost all the production of ferrochrome in Germany. In 2007, the Government of South Africa discussed legislation to reduce exports of unbeneficiated chromite and encourage greater production of ferrochrome domestically (Tran, 2007a; Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 67-77, 136).

Lead and Zinc.—BERZELIUS Metall GmbH was the leading producer of lead metal in Germany. The company was a subsidiary of Eco-Bat Technologies Ltd. of the United Kingdom, which was in turn a subsidiary of Quexco Inc. of Dallas, Texas. However, the significant increases in production of both primary and secondary lead in 2007 in Germany appeared to be mostly owing to increased production by Recylex. In 2007, Recylex expanded production capacity for both the primary and secondary lead circuits at the company's Nordenham smelter after 3 years of very little change or decreasing production there. The company also increased ownership control of zinc production in the country by acquiring the remaining shares of Norzinco GmbH. During the year, Recylex reportedly used only about 50% of the company's capacity to recycle batteries and other materials and expected to increase secondary production if supplies of these secondary materials were to become more available in 2008. The company estimated that it recycled only about 20% of the materials that were on the secondary market in 2007 (Recylex S.A., 2008, p. 3, 9; BERZELIUS Metall GmbH, undated).

Platinum-Group Metals.—The two main sources of platinum-group metals (PGMs) in the country were from the smelting of imported ores and concentrates that contained PGMs (mostly contained in imported copper ores and concentrates) and from recycling of catalytic converters and other scrapped materials that contain PGMs. (PGMs recovered from recycled materials account for about 45% of Germany's annual production, on average.) Because the annual increase in the production of primary smelted copper was only slightly greater than 0.5% compared with that of 2006, yet production of PGMs in the country was slightly greater than 18%, it appears that most of the increase in production of PGMs in 2007 was owing to secondary recovery (Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 100-102).

Industrial Minerals

Abrasives, Manufactured.—About 200,000 t/yr of raw materials (such as silicon carbide and fused alumina) are consumed in western Europe to manufacture abrasives, and Germany accounts for about one-third of this manufacturing use, on average. Of the nonmetallurgical alumina production capacity listed in table 2, Germany's production capacity of fused alumina was estimated to be about 80,000 t/yr. The country's capacity to produce crude crystalline silicon carbide (from combining silica sand together with petroleum coke at about 2,400 degrees centigrade) was estimated to be about 36,000 t/yr, but information concerning individual companies that produce the raw material in the country was unavailable. ESK-SiC GmbH used crude silicon carbide (some of which was imported from the Netherlands) to manufacture about 40,000 t/yr of micro and macro grit abrasives in Germany. Information concerning the exact company and type of abrasive material(s) that were the cause of the significant increase in production in 2007 in Germany was not available (table 2; Industrial Minerals, 2007b; Moores, 2007; O'Driscoll, 2007a; Tran, 2007b).

Cement.—During 2007, Germany had 58 cement kilns, 36 integrated cement plants, and 18 grinding centers (exclusively for grinding clinker) in operation. Cement consumption in Germany decreased by slightly less than 6% (to about 27.2 Mt) compared with that of 2006, mostly owing to a reduction in housing construction. Although cement production decreased only slightly, concerns about higher CO_2 emissions from manufacturing ordinary Portland cement (with a higher clinker content) led to a greater proportion of cement produced in the country to be blended with slag-based products. In effect, substituting blast furnace slag (recycled from pig iron production) for clinker meant that proportionally less limestone input was required to manufacture cement in Germany. Thus, less limestone was mined in 2007 than could have been expected if the average recipe for manufacturing cement had remained about the same as that of 2006. In 2007, HeidelburgCement accounted for about 29% of all cement sales in Germany. In May, HeidelburgCement acquired Hanson PLC of the United Kingdom, including Hanson's aggregate quarries and gravel pits in Germany. HeidelburgCement ended the year owning about 70 aggregates operations in Germany (Brodie, 2007; ICR Research, 2008).

Clay and Shale.—Süd-Chemie AG was the world's leading supplier of bentonite-based absorbents and foundry additives (added to molding-sand mixtures to improve metal casting processes), but about 80% of the company's revenues were accrued outside of Germany. The company was the second ranked producer of bentonite in the country. Domestic demand for Süd-Chemie's bentonite-based products increased owing mainly to the automobile industry's increased demand for iron castings and the manufacturing sector's increased demand for bentonite as an additive in plastics, and partly to a slight increase in demand for bentonite-based flocculents used in water treatment processes in Germany. S&B Industrial Minerals also increased production of bentonite in Germany in response to increased demand from the domestic foundry sector. In 2007, the country's exports of bentonite actually decreased to about 81,000 t compared with 89,000 t in 2006 (Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 168-169; S&B Industrial Minerals S.A., 2008, p. 17; Süd-Chemie AG, 2008, p. 2, 32, 64-65, 71-72).

Salt.—In 2007, production of salt in Germany decreased substantially compared with that of 2006, mostly owing to milder winter weather conditions in the EU. This had a negative effect on regional demand for salt used in de-icing compounds, which was a leading market for salt produced in Germany. The country's total annual exports of salt decreased to 2.8 Mt compared with about 3.9 Mt in 2006. Belgium was the leading destination in 2007 (accounting for 41.5% of Germany's total exports of salt) followed by the Czech Republic (9.5%), Sweden (7.3%), Italy (6.2%), Norway (6.0%), and the Netherlands (5.8%) (table 1; Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 168-169; K+S Aktiengesellschaft, 2008, p. 2, 31, 42, 45; Südwestdeutsche Salzwerke AG, 2008, p. 6-7).

After acquiring Sociedad Minera Punta de Lobos S.A. (of Chile) at the end of June 2006, the salt production division of K+S Aktiengesellschaft (K+S Salz GmbH) was the leading private (company) producer of salt in the world. In 2007, K+S estimated its global production capacity to be 16.2 Mt/yr of salt (including evaporated salt, rock salt, and salt contained in brines) and estimated the production capacity of state-owned China National Salt Industry Corp. to be 18.7 Mt/yr of salt. Within Germany, esco - european salt company GmbH & Co. KG had the capacity to produce about 5.3 Mt/yr of salt. Esco was a subsidiary of K+S Salz, which was completely acquired by K+S in 2004 and operated all of the company's (sodium) salt mines and plants in Europe. Südsalz GmbH, which was a 90% owned subsidiary of Südwestdeutsche Salzwerke AG, was the leading producer of salt in the country and controlled an estimated production capacity of about 5.5 Mt/yr of salt in Germany. In 2007, the proportion of K+S Aktiengesellschaft's total (from worldwide operations) revenues that were accounted for by sales of salt was about 16%, and 42% of company revenues was accounted for by sales of potash and magnesium products (table 2; Südsalz GmbH, 2006, p. 3, 10; K+S Aktiengesellschaft, 2008, p. 29-30, 42, 125-126; Südwestdeutsche Salzwerke AG, 2008, p. 3).

Silica.—Production of silica sand increased significantly compared with that of 2006, despite the burning down of the Hohenbocka plant (wholly owned and operated by Quarzwerke GmbH) near the end of 2006. Quarzwerke finished rebuilding the plant and reopened it in April 2008, and production of silica sand at Hohenbocka was restarted in May 2008. Reliable information concerning the silica sand production capacity of any of Quarzwerke's mines or plants was not generally available, except for those that were operated (and formerly independently owned) by Quarzwerke's subsidiary, Amberger Kaolinwerke GmbH—Eduard Kick GmbH & Co. KG. (Quarzwerke acquired

Amberger Kaolinwerke in 1995.) In 2004, Quarzwerke produced about 4.2 Mt of silica sand, in addition to whatever Amberger Kaolinwerke may have produced. As with increased production of bentonite in the country in 2007, increased production of silica sand was at least partially owing to increased demand from the aluminum, iron, and steel foundry sector. The foundry sector in Germany was a major market for German producers of silica sand, but information concerning the exact proportion of company revenues that were accounted for by sales to domestic foundries was not available (tables 1, 2; Quarzwerke GmbH, 2007, 2008, undated).

Mineral Fuels

Coal.—Hard coal mining was centered in the Ibbenbüren, the Ruhr, and the Saar coalfields in Germany and was uneconomical without subsidies because the current resources lie at great depths underground. After 2008, the trend of decreasing hard coal production was expected to resume owing to the policy of decreasing the Federal subsidy to hard coal mining in the country, which was expected to cause the closure of the Lippe Mine in 2009 and the Walsum Mine in 2010 and continue until all mines are closed around the time of the scheduled termination of the subsidy in 2018. Reliable information concerning the individual production capacities of these mines was not available at the time of this writing. The country's level of production of lignite in 2007 remained roughly equal to that of 2006, however, and was expected to remain a mainstay of the German mining industry and electrical power generation sector unless a more economic source of electrical power is developed. The Government set a goal for 12.5% of the country's energy consumption to be provided by renewable sources by 2010 and 20% by 2020. Lignite mining is primarily accomplished on the surface and is therefore much cheaper than mining hard coal deep underground. The cost per metric ton of mining hard coal in Germany was about 2.5 times greater than the average price of 1 t of hard coal imported from such countries as Australia, China, and South Africa (tables 1, 2; Casteel, 2007, p. 4; Economist, The, 2007b; Kirschbaum, 2007; Whitlock, 2007; Bundesministerium für Wirtschaft und Technologie, 2008a, p. 8-14; Bundesanstalt für Geowissenschaften und Rohstoffe, 2009, p. 212).

Natural Gas.—In 2007, 79 gasfields were in production in Germany and the gross level of production of natural gas decreased by about 8.6% compared with that of 2006, mostly in response to a decrease in demand caused by milder winter weather conditions. Consumption of natural gas in the country decreased to 96.3 billion cubic meters compared with 100.9 billion cubic meters in 2006, and domestic production was used to satisfy about 19% of consumption levels during each year. Imports of natural gas decreased by about 5.4%, and the major supplying countries, in decreasing order of the quantities of natural gas imported, were Russia, Norway, and the Netherlands. About 93% of natural gas production was from the state of Lower Saxony, and about 73% was accounted for by the production of subsidiaries of Exxon Mobil Corp. in Germany (including 100% of production by BEB Erdgas und Erdöl GmbH in the country, if any). Underground storage capacity increased by about 4% to 22 billion cubic meters of natural gas, and an additional 3.6 billion cubic meters of natural gas storage capacity was expected to be created in the near future, mostly in caverns of former salt mines (table 1; Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 45-46; 2009, p. 201-204; Landesamt für Bergbau, Energie und Geologie, 2008, p. 9).

Petroleum.—In 2007, 44 petroleum fields were in production in Germany and production of crude petroleum decreased by about 3% compared with that of 2006, mostly owing to depletion of reserves at existing fields. The Mittelplate-Dieksand (Mittelplate) Field (located in the tidal flats of the North Sea that are offshore of the state of Schleswig-Holstein) accounted for about 62% of the country's production of crude petroleum. Production of crude petroleum at Mittelplate decreased by 1.1% compared with that of 2006, and the decreased production out of this single field (21 wells) accounted for 23.7% of the total decrease in Germany during this timeframe. In 2007, the oilfields in Lower Saxony accounted for about 33% of total production of crude petroleum, and the three leading producing fields, in order of decreasing production levels, were the Ruehle (including the Ruehlermoor and the Ruehlertwist fields), the Bramberge, and the Emlichheim oilfields. Production of crude petroleum at these three fields decreased by an average of 6.5% compared with that of 2006, and the combined decrease in production from these fields (338 wells) accounted for 35.2% of the total decrease in Germany's production of crude petroleum. Domestic production was used to satisfy about 3% of the country's consumption of crude petroleum during 2007 (tables 1, 2; Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 42-43; 2009, p. 195-198; Landesamt für Bergbau, Energie und Geologie, 2008, p. 9, 28-29, 31).

Reserves and Resources

Germany possesses considerable reserves of many industrial minerals and lignite. In 2007, the country's reserves of lignite stood at 40.8 billion metric tons (Gt), and additional lignite resources, at about 36.8 Gt. Mining has had a long tradition in Germany and the country still has diverse resources of coal, metallic, and nonmetallic minerals. Primarily owing to high metal prices in 2007, there was notable investment in exploration for metallic minerals in Germany, but no reserves of metallic minerals were discovered. It was expected that there would be no mining of anthracite and bituminous coal once the hard coal subsidy is terminated, but the country was still estimated to have about 83 Gt of anthracite and bituminous coal resources. Of this amount, the Government classified about 118 Mt as reserves that could still be profitably produced during the remaining years of the hard coal subsidy. At the end of 2007, the Government estimated petroleum reserves to be about 270 million barrels (Mbbl), which was about 10% less than at the beginning of the year. It also estimated that 63% of the country's remaining reserves of petroleum was located in the State of Schleswig-Holstein (mostly offshore) and that 34% was located in the State of Lower Saxony. Reserves of natural gas decreased by about 6% to 218 billion cubic meters, and the Government expected that most of Germany's continuing production of crude petroleum and natural gas would not be replaced by new reserves in the coming years, despite increased exploration in 2007. About 98% of the country's remaining reserves of natural gas are located in the State of Lower Saxony. In 2007, Germany's main reserves were, in decreasing order of value, lignite, kaolin, feldspar, oil shale, rock salt, potash, bentonite, coking coal, sulfur, barite, graphite, fluorspar, silica sand, natural stone aggregates, potash-magnesium salts and anhydrite, and dolomite-limestone-marl. Reliable information on Germany's reserves of industrial minerals was not available (Casteel, 2007, p. 2, 4, 10, 12; Bundesanstalt für Geowissenschaften und Rohstoffe, 2008, p. 13-15, 21-23, 27, 31-32, 42, 45, 49, 173, 179, 185, 193; 2009, p. 198, 204, 213; Landesamt für Bergbau, Energie und Geologie, 2008, p. 9).

Outlook

In 2007, costs for energy and mineral raw materials continued to increase in the country and created challenges for maintaining the country's large metal processing capacity. All metal processing sectors appeared to be affected, especially production of ferroalloys from imported ores and concentrates. Rising costs in Germany combined with increasing capacity to process ores and concentrates closer to the sources (in other countries) will remain a challenge for the metal processing sector, especially if metal prices decrease proportionally more than input costs for the companies in this sector. Because metal foundries are an important source of demand for such industrial minerals as bentonite and silica in Germany, changes in foundry production could have a corresponding effect on levels of production of these industrial minerals in the country.

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TABLE 1
GERMANY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
METALS						
Aluminum:						
Alumina[e]	thousand metric tons	830	835	830	850	1,000
Aluminum hydroxide, Al_2O_3 equivalent	do.	1,051	1,174	1,255	1,393	1,388
Metal:						
Primary		660,793	667,839	647,934	515,539	551,030
Secondary		680,385	703,756	718,291	795,668	835,610
Total		1,341,178	1,371,595	1,366,225	1,311,207	1,386,640
Cadmium, metal, refinery including secondary[e]		640 [2]	640	640	640	400
Cobalt, matte, including shavings and scrap		544 [e, 3]	721	601	686	685
Copper, metal:						
Smelter:						
Primary		288,800	278,600	257,200	273,800	275,300
Secondary		306,600	262,600	251,400	266,300	265,600
Total		595,400	541,200	508,600	540,100	540,900
Refined:						
Primary		286,653	283,686	293,812	312,092	301,702
Secondary		310,925	368,956	344,446	350,246	363,815
Total		597,578	652,642	638,258	662,338	665,517
Gallium, crude[e]		12	12	12	12	12
Indium, refined[e]		10	10	10	10	10
Iron and steel:						
Ore, run of mine:[4]						
Gross weight	thousand metric tons	429	412	360 [r]	416 [r]	422
Fe content	do.	45 [r]	43 [r]	38	44	44
Metal:						
Pig iron	do.	29,461	30,018	28,854	30,362	31,149
Direct reduced iron	do.	590	593	440	580	600
Ferroalloys:						
Ferrochromium		18,318	24,857	22,672	26,710	22,030
Other[e, 5]		32,000	26,500 [r]	25,400 [r]	24,100 [r]	5,000
Steel, crude	thousand metric tons	44,809	46,377 [r]	44,524	47,224	48,550
Semimanufactures	do.	37,174	39,976	37,771	41,174	41,999
Lead, metal, refined:						
Primary		132,155	115,869	118,778	100,450	110,934
Secondary		224,742 [r]	243,304	222,932	221,050	244,147
Total		356,897 [r]	359,173	341,710	321,500	355,081
Magnesium, metal including castings		25,987	26,985 [r]	27,282	30,556	30,791
Platinum-group metals, metal, refined	kilograms	51,847	95,135	104,725	116,350 [r]	137,645
Selenium, metal[e]		661 [2]	1,000	2,000	2,500	2,500
Silicon, metal		27,870	28,773	29,349	35,500 [r, e]	35,254
Silver, metal, refined, including secondary[6]		592	568	546	439 [r]	417
Tin, alloys		6,143	5,431	5,612 [r]	6,046 [r]	6,674
Zinc, metal:						
Primary		255,195 [r]	252,133	245,140	245,883	237,638
Secondary		132,936 [r]	129,887	89,751	96,683	97,253
Total		388,131	382,020	334,891	342,566	334,891
INDUSTRIAL MINERALS						
Abrasives, manufactured		59,097	72,565	73,620	75,817	84,666
Aluminum salt slag, Al_2O_3 equivalent[e]	thousand metric tons	200	200	200	200	200
Barite, marketable (contained $BaSO_4$)		109,506	93,624	88,591	85,524	88,265
Boron compounds, manufactured, including boric acid and oxide		176,837	168,841	203,475	222,169	217,885
Bromine compounds, including oxide		388	248	274	431	1,612
Cement:						
Clinker, intended for market	thousand metric tons	25,233	26,281	24,378	24,921 [r]	26,992 [p]
Hydraulic	do.	32,749	31,854	31,009	33,630 [r]	33,382 [p]

See footnotes at end of table.

TABLE 1—Continued

GERMANY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
INDUSTRIAL MINERALS—Continued						
Chalk, natural, including ground	thousand metric tons	1,001	1,005	1,068	1,309	1,358
Clays, natural:						
Bentonite	do.	479	405	352	364	385
Ceramic and refractory clays[e]	do.	4,280 [r]	4,400	4,430 [r]	4,600	4,400
Of which, fire clay and chamotte	do.	167	176	176	194	252
Kaolin, marketable	do.	3,504	3,752	3,768	3,815	3,843
Other, unspecified	do.	191	197	185	509	467
Diatomite[e]	do.	55 [2]	54	54	54	54
Feldspar		233,028	182,842	168,640	167,332	171,303
Fluorspar, acid-grade		33,289	33,203	35,364	53,009	54,359
Graphite, mine output		2,840	3,155	2,638	--	--
Gypsum and anhydrite:						
Natural	thousand metric tons	1,748	1,579	1,644	1,771	1,898
Byproduct of flue-gas desulfurization[e]	do.	7,660	7,660	7,640	7,490 [r]	7,400 [p]
Lime, quicklime, dead-burned dolomite	do.	6,876	6,947	6,823	7,119	7,218
Magnesium compounds, byproduct of potash mining	do.	1,288	1,197	1,290	1,203	1,357
Nitrogen, N content of ammonia	do.	2,803	2,741	2,789	2,718	2,746
Peat, natural[e]		135,356 [2]	119,961 [2]	116,000 [r]	108,000 [r]	109,000
Phosphoric acid, manufactured, P_2O_5 content		32,569	37,810	37,374	34,373	31,684
Pigments, iron oxide[e]		4,000	4,000	4,000	4,000	4,000
Potash, K_2O content:						
Crude	thousand metric tons	4,413	4,439	4,434	4,385	4,406
Marketable	do.	3,563	3,627	3,664	3,625	3,637
Salt, NaCl content, marketable:						
Evaporated salt, including marine salt	do.	727	572	594	593	318
Industrial brines	do.	9,078	10,432	9,904	9,590	7,540
Rock salt and other brines	do.	6,620	7,833	8,834	9,663	7,819
Total	do.	16,425	18,837	19,332	19,846	15,677
Siliceous earth, marketable		54,517	54,801	50,399	53,282	51,980
Soda ash (Na_2CO_3), manufactured	thousand metric tons	1,493	1,438	1,533	1,515	1,510
Stone, sand and gravel:						
Stone, crude:						
Dimension, including partially worked	do.	167	229	212	219	200
Of which, dolomite and limestone	do.	106	76	75	75	63
Crushed, not including chalk	do.	160,851	152,985	150,117	162,168	152,790
Dolomite and limestone, not for cement manufacture	do.	30,000	23,700	20,600	22,400	22,800
Gravel, natural:						
Building gravel	do.	70,173	65,566	62,498	68,706	65,370
Crude, including flint and pebbles	do.	13,632	12,889	12,753	13,301	12,928
Other gravel, including quarzite	do.	13,295	10,898	12,014	13,326	12,639
Sand, natural:						
Building sand	do.	67,603	63,619	57,463	59,767	56,851
Silica sand, including glass sand and quartz sand	do.	7,953	8,162	7,681	7,703	8,382
Other, including from granite and pegmatite	do.	13,115	13,239	13,185	13,578	12,796
Total sand and gravel	do.	185,771	174,373	165,594	176,381	168,966
Strontium carbonate, manufactured[e]	do.	80	80	80	80	80
Sulfur:						
Marketable	do.	1,014	939	1,055	1,114	1,093
Byproduct:						
Metallurgy[e]	do.	701 [2]	591 [2]	600	600	600
Natural gas and petroleum	do.	1,661	1,503	1,585	1,686	1,637
Total[e]	do.	2,362 [2]	2,094 [2]	2,190	2,290	2,240

See footnotes at end of table.

TABLE 1—Continued

GERMANY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bitumen, natural		1,680	--	--	--	--
Carbon black	thousand metric tons	348	340	333	631	665
Coal:						
Anthracite and bituminous, marketable	do.	25,873	25,872	24,907	20,882	21,307
Lignite	do.	179,087	181,926	177,908	176,324	180,409
Coke:						
Of anthracite and bituminous coal	do.	7,827	8,479	8,397	8,372	8,441
Of lignite	do.	165	187	173	181	173
Fuel briquets:						
Of anthracite and bituminous coal	do.	114	102	92	96	89
Of lignite, including dust and dried	do.	1,466	1,435	1,490	1,662	1,328
Gas:						
Manufactured:						
Blast furnace[e]	million cubic meters	9 [2]	9	9	9	9
Coke oven	do.	952 [r]	974 [r]	974 [r]	958 [r]	970
Total[e]	do.	961 [r, 2]	983 [r]	983 [r]	967 [r]	979
Natural:						
Gross	do.	22,092	20,264	19,762	19,667	17,966
Marketable	do.	20,190	19,333	18,666	18,443	16,884
Petroleum:[7]						
Crude	thousand 42-gallon barrels	27,900	25,800	26,200	25,800	25,000
Refinery products:						
Liquefied petroleum gas	do.	38,000	37,000	37,000	37,000	39,000
Distillate fuel oil	do.	360,000	370,000	390,000	380,000	380,000
Residual fuel oil	do.	69,000	77,000	74,000	76,000	75,000
Gasoline, including aviation	do.	210,000	210,000	210,000	210,000	200,000
Kerosene and jet fuel	do.	32,000	34,000	33,000	34,000	35,000
Naphtha	do.	86,000	94,000	94,000	90,000	86,000
Refinery gas	do.	51,600	51,300	50,600	49,100	48,300
Bitumen, bituminous mixtures, and other residues	do.	30,000	29,000	32,000	31,000	31,000
Lubricants and miscellaneous oils	do.	11,000	15,000	14,000	16,000	17,000
Petroleum coke	do.	10,000	10,000	11,000	11,000	11,000
Mineral jelly, waxes, and paraffins	do.	1,500	1,800	1,800	2,000	2,100
Other	do.	8,400	11,000	9,400	9,800	11,000
Total	do.	910,000	940,000	960,000	950,000	940,000
Uranium concentrate, U_30_8 content		177	91	111	77	48

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [p] Preliminary. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through March 31, 2009.

[2] Reported figure.

[3] Marketed production [Statistische Bundesamt, 2006, Fachserie 4, Reihe 3.1—Produzierendes Gewerbe, Produktion im Produzierenden Gewerbe, Jahr 2005: Wiesbaden, Germany, Statistische Bundesamt, November 5, p. 187].

[4] Iron ore is used domestically as an additive in cement and other construction materials but is of too low a grade to be used in the steel industry.

[5] Estimated from reported total marketed production of ferroalloys [Statistische Bundesamt, 2008, Fachserie 4, Reihe 3.1—Produzierendes Gewerbe, Produktion im Produzierenden Gewerbe, Jahr 2007: Wiesbaden, Germany, Statistische Bundesamt, June 5, p. 176].

[6] Estimated by subtraction of primary from total, and rounded to four significant digits.

[7] All figures were converted to barrels from those reported in metric tons according to data from Mineralölwirtschaftsverband e.V., 2008, Jahresbericht—Mineralöl-Zahlen, 2007: Hamburg, Germany, Mineralölwirtschaftsverband e.V., May, p. 48, 75, 79, and reflect significant digits of conversion factors (three digits for crude petroleum and two digits for refinery products).

TABLE 2
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1]

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners[2]	Location of main facilities	Annual capacity
Abrasives (silicon carbide)	ESK-SiC GmbH	Plant at Grefrath, Cologne	65
Alumina	Almatis GmbH (Dubai International Capital LLC)	Plant at Ludwigshafen	NA
Do.	Nabaltec AG	Plant at Schwandorf	120
Do.	Aluminium Oxid Stade GmbH (DADCO Alumina & Chemicals Ltd., 100%)	Plant at Stade	1,000 e
Do.	Martinswerk GmbH (Albemarle Corp., 100%)	Plant at Bergheim	350
Aluminum	Hydro Aluminium Deutschland GmbH (Norsk Hydro ASA, 100%)	Rheinwerk primary smelter at Neuss	230
Do.	Aluminium Norf GmbH (Novelis Inc. [Hindalco Industries Ltd., 100%], 50%, and Hydro Aluminium Deutschland GmbH, 50%)	Lippenwerk at Luenen (secondary) and rolling mill at Neuss	1,500
Do.	Metallhüttenwerke Bruch GmbH	Secondary foundry alloy plant at Dortmund; secondary cast alloy plants at Asperg and Bad Saeckingen	110
Do.	Aleris Recycling GmbH (Aleris International Inc., 100%)	Secondary smelters: Erftwerk at Grevenbroich, Innwerk at Toeging am Inn, and Neckarwerk at Deizisau	320
Do.	Trimet Aluminium AG	Smelter at Essen-Borbeck	175 e
Do.	Hamburger Aluminium-Werke GmbH (Trimet Aluminium AG, 100%)	Primary smelter at Hamburg	133
Do.	Corus Aluminium Voerde GmbH (Tata Steel Ltd., 100%)	Primary smelter at Voerde, North Rhine-Westphalia	90
Aluminum salt slag	Alsa Technologies GmbH (Agor AG, 100%)	Plants at Hannover, Luenen, and Toeging	250
Do.	K+S Entsorgung GmbH (K+S Aktiengesellschaft, 100%)	REKAL plant at Sigmundshall	100
Arsenic, metal metric tons	PPM Pure Metals GmbH[3] (Recylex S.A., 100%)	Plant at Langelsheim	5
Do. do.	Reinstmetalle Osterwieck GmbH (PPM Pure Metals GmbH[3], 100%)	Plant at Osterwieck	NA
Barite	Sachtleben Bergbau GmbH	Clara Mine in the Black Forest and plant at Wolfach, and Dreislar Mine at Medebach-Dreislar	87
Do.	Deutsche Baryt-Industrie Dr. Rudolf Alberti GmbH & Co. KG (Sachtleben Bergbau GmbH, 75%, and other private, 25%)	Wolkenhügel mine in the Harz Mountains and plant at Bad Lauterberg	50
Bentonite	Süd-Chemie AG	Mining near Gammelsdorf, Bavaria, and plants at Moosburg, Duisburg, and Heufeld	500
Do.	S&B Industrial Minerals GmbH (S&B Industrial Minerals S.A., 100%)	Mining in region between Landshut and Mainburg, Bavaria	400
Do.	do.	Stollberg plant at Oberhausen	200 e
Do.	do.	Plant at Neuss	50
Do.	Kärlicher Ton- und Schamotte-Werke Mannheim & Co. KG (KTS)	Quarry at Muelheim-Kaerlich	50
Calcium carbonate, natural, ground	Alpha Calcit Fullstoff GmbH & Co. KG	Plant at Cologne	250
Do.	Omya GmbH (Omya AG, 100%)	Plants at Burgberg, Emden, Lagerdorf, and Sohlde, and another plant near Hamburg	2,250
Do.	Eduard Merkle GmbH & Co. KG	Mine at Ulm, Blaubeuren	NA
Calcium carbonate, natural, including chalk	Vereinigte Kreidewerke Dammann KG (OMYA AG, 100%)	Quarries and plants at Laegerdorf, on Ruegen Island, and at Soehlde	500
Cement	HeidelbergCement AG	Plant at Burglengenfeld; two plants at Ennigerloh; two plants at Geseke; plants at Koenigs Wusterhausen, Leimen, Paderborn, Mainz-Weisenau, and Schelklingen; the Lengfurt plant at Triefenstein; and plant at Wetzlar	9,500 e
Do.	Dyckerhoff AG (Buzzi Unicem SpA, 88.37%, and other private, 11.63%)	Plants at Deuna, Geseke, Goellheim, Lengerich, Neuss, Neuwied, and the Amöneburg plant at Wiesbaden	7,200
Do.	CEMEX Deutschland AG (CEMEX S.A. de C.V., 100%)	Two plants at Beckum; plants at Dortmund, Duisburg, Eisenhuettenstadt, and Ruedersdorf	6,000

See footnotes at end of table.

TABLE 2—Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1]

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners[2]	Location of main facilities	Annual capacity
Cement—Continued	SCHWENK Zement KG	Plants at Allmendingen, Bernburg, Heidenheim-Mergelstetten, and Karlstadt	5,000 [e]
Do.	Holcim (Deutschland) AG (Holcim Ltd., 88.9%, and other private, 11.1%)	HANSA plant at Bremen, plants at Laegerdorf and Rostock, and the Höver plant at Sehnde	3,600
Do.	Lafarge Zement GmbH (Lafarge S.A., 100%)	Plants at Kall-Soetenich, Karsdorf, and Walzbachtal	3,500
Do.	Holcim (Baden-Württemberg) AG (Holcim Ltd., 100%)	Plant at Dotternhausen	1,600
Do.	TEUTONIA Zementwerk AG (HeidelbergCement AG, 94.2%, and other private, 5.8%)	Plant at Hannover	900
Do.	Märker Zement GmbH	Plants at Harburg and Lauffen	NA
Clay, including ball and refractory clays	Stephan Schmidt KG	Tonbergbau Grube Anton open pit mine, Dornburg-Langendernbach, Müllenbach and Thewald Mines, Hoehr-Grenzhausen; Wiesa-Thonberg and Cunnersdorf quarries, Kamenz-Wiesa, Westerwald	1,400 [e]
Do.	Marx Bergbau GmbH & Co. KG (Stephan Schmidt KG, 100%)	Lämmersbach and Meudt Mines, Ruppach-Goldhausen quarry, Dornburg-Langendernbach, Westerwald	350
Do.	Goerg & Schneider GmbH & Co. KG	Quarry and main plant at Boden, others at Mogendorf, Goddert, Siershahn, Wirges/Staudt, and Kettenbach/Taunus, Westerwald region; others in Saxony and Eifel regions	NA
Do.	Mittelhessische Tonbergbau GmbH (Goerg & Schneider GmbH & Co. KG, 50%, and Stephan Schmidt KG, 50%)	Quarry and plant in the Giessen/Lahn region	100
Do.	Rohstoffgesellschaft GmbH Ponholz	Mine and chamotte plant at Maxhuette-Haidoff, and Aufofweiher Mine, Bavaria	100
Do.	Adolf Gottfried Tonwerke GmbH	Quarries and plant near Grossheirath, Coburg, Bavaria	100
Coal, anthracite and bituminous	Deutsche Steinkohle AG (RAG Aktiengesellschaft, 100%)	Augusta Victoria/Blumenthal, Lippe, Ost, Prosper-Haniel, Walsum, and West Mines, Ruhr region, North Rhine-Westphalia	16,000
Do.	do.	Saar Mine, Saar Basin, Saarland	6,000
Do.	do.	Ibbenbüren Mine, Steinfurt District, North Rhine-Westphalia	2,100
Coke	Deutsche Steinkohle AG (RAG Aktiengesellschaft, 100%)	Pitside coking plant at the Prosper-Haniel Mine	2,000 [e]
Do.	ThyssenKrupp Steel AG	Schwelgern plant at Duisburg	2,100
Do.	Hüttenwerke Krupp Mannesmann GmbH (ThyssenKrupp Steel AG, 50%; Vallourec & Mannesmann Tubes SA, 20%; Mannesmannröhren-Werke GmbH, 30%)	Plant at Duisberg-Huckingen steel complex	1,100
Copper, refined	Norddeutsche Affinerie AG (L. Possehl & Co. mbH, 10%; other institutional investors, 45%; and other private investors, 45%)	Primary smelter and refinery and secondary plant at Hamburg	560 [e]
Do.	Hüttenwerke Kayser AG (Norddeutsche Affinerie AG, 100%)	Secondary plant and refinery at Luenen	185 [e]
Dolomite	Rheinkalk Hagen-Halden GmbH & Co KG (Lhoist NV, 100%)	Steinbruch-Donnerkuhle quarry and Hönnetal plant at Menden, and plant at Hagen-Halden	7,500
Dolomite and lime	Geomin Erzgebirgische Kalkwerke GmbH	Underground mines at Hermsdorf and Lengenfeld	NA
Feldspar	Amberger Kaolinwerke GmbH—Eduard Kick GmbH & Co. KG (Quarzwerke GmbH, 100%)	Mine at Hirschau, Bavaria	135
Do.	Saarfeldspatwerke H. Huppert GmbH & Co. KG	Mine at Oberthal, Gudesweiler, Saarland	60
Do.	Gottfried Feldspat GmbH	Mine at Freihung-Thansuss, Weiden, Bavaria	15
Feldspar, kaolin, and quartz	Gebrüder Dorfner GmbH & Co Kaolin - und Kristallquartzsand Werk KG	Mine near Hirschau, Bavaria	NA
Ferrochrome	Elektrowerk Weisweiler GmbH (Kermas Ltd., 100%)	Plant at Eschweiler-Weisweiler, near Aachen	30

See footnotes at end of table.

TABLE 2—Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1]

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners[2]	Location of main facilities	Annual capacity
Fluorspar		Sachtleben Bergbau GmbH	Clara Mine in the Black Forest and plant at Wolfach	35
Gallium	metric tons	Geo Gallium S.A. (Mining & Chemical Products Ltd., 50%, and Recapture Metals Inc., 50%)	Ingal plant at Stade	35
Do.	do.	PPM Pure Metals GmbH[3] (Recylex S.A., 100%)	Plant at Langelsheim	NA
Graphite, manufactured		Graphit Kropfmühl AG	Plant at Kropfmuehl, Passau	20
Do.		do.	Plants at Bad Godesberg and Wedel, Holstein	8
Gypsum		VG-ORTH GmbH & Co. KG	Mine and plant at Stadtoldendorf, and plants at Osterode, Spremberg, and Witzenhausen	150
Do.		Gyproc GmbH Baustoff Production & Co. KG	Mines and plant in Lower Saxony	110
Iron, pig		ThyssenKrupp Steel AG	Two blast furnace plants at Hamborn and Schelgern	12,000
Iron oxide, pigments		Lanxess AG	Plant at Krefeld-Uerdingen	300
Kaolin		WBB Fuchs GmbH & Co. KG, subsidiary of WBB Minerals plc (S.C.R.- Sibelco NV, 100%)	25 quarries and 8 plants, including 2 at Ransbach and Kannenbäckerland plant in Hoehr-Grenzhausen, Westerwald region; also including quarries and plants of Kaolin- und Tonwerke Seilitz-Loethain, Saxony region	2,000
Do.		Amberger Kaolinwerke GmbH—Eduard Kick GmbH & Co. KG (Quarzwerke GmbH, 100%)	Mines at Caminau, Hirschau, Kemmlitz, and Schnaittenbach	350
Do.		Rohstoffgesellschaft mbH Ponholz (Teublitzer Ton GmbH, 51%, and Erich Koller Group, 49%)	Mines at Maxhutte-Haidhof and Auhofweiher	150
Do.		Erbsloh Lohrheim GmbH (Erbsloh Family, 100%)	Mine at Lohrheim, Rheinland-Pfalz	30
Lead		Weser Metall GmbH (Recylex S.A., 100%)	Primary and secondary smelter and refinery at Nordenham	145
Do.		BERZELIUS Metall GmbH (Eco-Bat Technologies Ltd. [Quexco Inc., 100%], 100%)	Primary smelter at Stolberg and secondary smelters at Braubach am Rhein and Freiberg/Sachsen	200
Do.		Sudamin MHD GmbH	Refinery at Duisburg	120
Do.		Norddeutsche Affinerie AG	Refinery at Hamburg	50
Lignite		RWE Power AG (RWE Aktiengesellschaft, 100%)	Open pit mines in Rhenish mining area: Bergheim, Garzweiler, Inden, and Hambach	105,000
Do.		Vattenfall Europe Mining AG	Jänschwalde-Cottbus-Nord, Nochten, and Welzow-Süd mines, Lausatian mining area	60,000
Do.		Mitteldeutsche Braunkohlengesellschaft AG	Profen and Vereinigtes Schleenhain mines	25,000
Limestone		Harz-Kalk GmbH	Quarry at Ruebeland	2,000 e
Do.		Kalkwerk Bad Kösen GmbH	Quarry at Bad Koesen	2,000 e
Do.		Fels-Werke GmbH	Quarry at Kaltes Tal	2,000 e
Do.		Schäfer Kalk GmbH & Co KG	Plants at Hahnstaetten, Steeden, Stromberg, and Grevenbrueck	3,000
Do.		Rheinkalk GmbH & Co KG (Lhoist NV, 100%)	Flandersbach quarry and plant at Wuelfrath	7,500
Magnesium, metal, secondary		Norsk Hydro Magnesiumgesellschaft GmbH (Norsk Hydro ASA, 100%)	Plant at Bottrop	26
Do.		Aleris Recycling GmbH (Aleris International Inc., 100%)	Plant at Toeging am Inn	15
Do.		do.	Plant at Deizisau	50
Natural gas	million cubic meters	Mobil Erdgas-Erdöl GmbH (Exxon Mobil Corp., 100%), including any fields owned or operated by BEB Erdgas und Erdöl GmbH (Exxon Mobil Corp., 50%, and Royal Dutch Shell plc, 50%)	Goldenstedt, Hemmelte, Klosterseelte, Söhlingen, and other fields in Lower Saxony	14,000 e
Do.	do.	RWE-Dea AG (RWE Power AG, 100%)	Bötersen, Hemsbünde, Völkersen, and smaller fields in Lower Saxony; and Inzenham-West Field, Bavaria	3,000 e
Do.	do.	Gaz de France Produktion Exploration Deutschland GmbH (Gaz de France S.A., 100%)	Salzwedel Field, Saxony-Anhalt; Schneeren and smaller fields in Lower Saxony	1,500 e
Do.	do.	Wintershall Holding AG (BASF AG, 100%)	A6/B4 blocks offshore of Schleswig Holstein; and smaller fields in Lower Saxony	1,200 e
Do.	do.	EEG-Erdgas Erdöl GmbH (Gaz de France S.A., 100%)	Muehlhausen and other fields in Thüringen	50 e

See footnotes at end of table.

TABLE 2—Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1]

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners[2]	Location of main facilities	Annual capacity
Petroleum:			
Crude thousand 42-gallon barrels	Wintershall Holding AG (BASF AG, 100%), 50%, and RWE-Dea AG (RWE Power AG, 100%), 50%	Mittelplate-Dieksand field, in tidal flats of the North Sea, offshore of Schleswig-Holstein	15,500
Do. do.	Wintershall Holding AG (BASF AG, 100%)	A6/B4 blocks offshore of Schleswig Holstein; Aitingen Field, Bavaria; Emlichheim Field, Lower Saxony; and smaller fields in Lower Saxony and Rheinland-Pfalz	2,000 ^{e}
Do. do.	Gaz de France Produktion Exploration Deutschland GmbH (Gaz de France S.A., 100%)	Bramberge, Ruehlertwist, Scheerhorn, and Ringe fields in Lower Saxony; and smaller fields in the states of Bavaria, Hamburg, Lower Saxony, and Mecklenburg-Western Pomerania	3,500 ^{e}
Do. do.	Mobil Erdgas-Erdöl GmbH (Exxon Mobil Corp., 100%)	Barenburg, Ruehme, and Lueben fields, Lower Saxony; and smaller fields in the states of Lower Saxony and Rheinland-Pfalz	1,800 ^{e}
Do. do.	BEB Erdgas und Erdöl GmbH (Exxon Mobil Corp., 50%, and Royal Dutch Shell plc, 50%)	Georgsdorf, Meppen, and Ruehlermoor fields, west of the Ems river (Emsland), Lower Saxony	3,000 ^{e}
Refined do.	Deutsche Shell AG	Refineries at Godorf, Hamburg, and Grasbrook	256,000 ^{e}
Do. do.	Esso Deutschland GmbH (ExxonMobil Central Europe Holding GmbH, 100%)	Refineries at Karlsruhe and Ingolstadt	245,000 ^{e}
Do. do.	Ruhr Oel GmbH (Petróleos de Venezuela S.A., 50%, and BP Gelsenkirchen GmbH, 50%)	Refinery at Gelsenkirchen	215,500 ^{e}
Do. do.	BAYERNOIL Raffineriegesellschaft mbH (OMV AG, 45%; Ruhr Oel GmbH, 25%; AGIP Deutschland GmbH, 20%; Deutsche BP AG, 10%)	Refinery at Neustadt-Donau	145,000 ^{e}
Potash, K_2O content	K+S Kali GmbH (K+S Aktiengesellschaft, 100%)	Mines at Bergmannssegen-Hugo, Niedersachsen-Riedel, Salzdetfurth, Sigmundshall, Hattorf, Neuhof-Ellers, Sondershausen, Unterbreizbach, Wintershall, and Zielitz	6,000
Salt (evaporated and rock)	esco - european salt company GmbH & Co. KG (K+S Salz GmbH [K+S Aktiengesellschaft, 100%])	Bernburg Mine and evaporated salt works; Borth Mine and evaporated salt works near Wesel; and the Braunschweig-Lüneburg Mine near Helmstedt	5,300 ^{e}
Do.	Wacker Chemie AG	Stetten rock salt mine near Haigerloch	500
Do.	Südsalz GmbH (Südwestdeutsche Salzwerke AG, 90%, and Vereinigte Schweizerische Rheinsalinen AG, 10%)	Berchtesgaden and Heilbronn rock salt mines; and evaporated salt works at Bad Reichenhall and Bad Friedrichshall-Kochendorf	5,500 ^{e}
Do.	Saline Luisenhall GmbH	Evaporated salt works at Göttingen	NA
Selenium, metal metric tons	Retorte GmbH (Norddeutsche Affinerie AG, 100%)	Plant at Röthenbach	2,500
Silica sand (industrial sand)	Quarzwerke GmbH	Mines and plants at Frechen, Gambach, Haltern, Hohenbocka, and Weferlingen	4,500 ^{e}
Do.	Amberger Kaolinwerke GmbH—Eduard Kick GmbH & Co. KG (Quarzwerke GmbH, 100%)	Mines and plants at Hirschau and Schnaittenbach	850
Siliceous earth, silica	Hoffmann Mineral and Co. KG	Mine and plant near Neuburg	55
Silicon, metal metric tons	RW Silicium GmbH (Graphit Kropfmühl AG, 100%)	Four electric arc furnaces in plant at Pocking	27,500
Steel, crude	ThyssenKrupp Steel AG (ThyssenKrupp AG, 100%)	Bruckhausen and Beeckerwerth plants, near Duisburg	12,000
Do.	Salzgitter AG	Plants at Peine and Salzgitter	6,400 ^{e}
Do.	Hüttenwerke Krupp Mannesmann GmbH (ThyssenKrupp Steel AG, 50%; Vallourec & Mannesmann Tubes SA, 20%; and Mannesmannröhren-Werke GmbH, 30%)	Plant at Duisberg-Huckingen	5,600
Do.	ArcelorMittal Bremen GmbH (ArcelorMittal, 99.88%, and other private, 0.12%)	Plant at Bremen	4,000
Do.	Saarstahl AG (Struktur-Holding-Stahl GmbH & Co KG, 74.9%, and Dillinger Hüttenwerke AG, 25.1%)	Plants at Burbach, Neunkirchen, and Voelklingen	3,000
Do.	AG der Dillinger Hüttenwerke (ArcelorMittal, 51.25%; Saarstahl AG, 33.75%; and Struktur-Holding-Stahl GmbH & Co KG, 15%)	Plant at Dillingen	2,800

See footnotes at end of table.

TABLE 2—Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1]

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners[2]	Location of main facilities	Annual capacity
Steel, crude—Continued	ArcelorMittal Eisenhüttenstadt GmbH (ArcelorMittal, 100%)	Plant at Eisenhuettenstadt	2,800
Do.	Badische Stahlwerke GmbH	Plant at Kehl	2,300 [e]
Do.	Brandenburger Elektrostahlwerk GmbH (RIVA FIRE S.p.A, 100%)	Plant at Brandenburg	1,700 [e]
Do.	ThyssenKrupp Nirosta (ThyssenKrupp Steel AG, 100%)	Plants at Bochum and Krefeld	1,600 [e]
Do.	ArcelorMittal Ruhrort GmbH (ArcelorMittal, 100%)	Plant at Duisburg	1,500 [e]
Do.	Georgsmarienhütte GmbH	Plants at Bous, Georgsmarienhuette, and Groeditz	1,300 [e]
Do.	Stahlwerk Thüringen GmbH (Alfonso Gallardo S.A., 100%)	Plant at Unterwellenborn	1,100 [e]
Do.	Deutsche Edelstahlwerke GmbH	Plants at Siegen and Witten	1,100 [e]
Do.	Lech-Stahlwerke GmbH (Max Aicher GmbH & Co. KG, 100%)	Plant at Herbertshofen	1,100 [e]
Do.	ArcelorMittal Hamburg GmbH, (ArcelorMittal, 100%)	Plant at Hamburg	1,100 [e]
Do.	Hennigsdorfer Elektrostahlwerk GmbH (RIVA FIRE S.p.A, 100%)	Plant at Hennigsdorf	1,000 [e]
Do.	Elbe-Stahlwerke Feralpi GmbH (Feralpi Siderurgica S.p.A., 100%)	Plant at Riesa	950 [e]
Strontium carbonate	Solvay & CPC Barium Strontium GmbH & Co. KG (Solvay S.A., 75%, and Chemical Products Corporation, 25%)	Plant at Bad Hoenningen, near Hannover	95
Sulfur	Norddeutsche Erdgas-Aufbereitungs GmbH NEAG (BEB Erdgas und Erdöl GmbH [ExxonMobil Production Deutschland GmbH, 50%, and Royal Dutch Shell plc, 50%], 100%)	Natural gas desulfurization plants at Grossenkneten and Voigtei (near Nienburg-Weser), Lower Saxony	600
Zeolites	Hans G. Hauri Mineralstoffwerk GmbH	Mine and plant at Boetzingen, near Freiburg	NA
Zinc, metal	Metaleurop Zinkbetrieb GmbH & Co. KG (Xstrata plc, 100%)	Smelter at Nordenham	150
Do.	Ruhr-Zink GmbH (GEA Group AG, 100%)	Refinery at Datteln[4]	140
Do.	Sudamin Rohstoff GmbH	Smelter at Duisburg[5]	100
Do.	Harz Metall GmbH (Recylex S.A., 100%)	Waëlz rotary kilns at Oker-Goslar	38 [e]
Zinc, oxides	Norzinco GmbH (Recylex S.A., 100%)	Secondary plant at Oker-Goslar	24

[e] Estimated; estimated data are rounded to no more than three significant digits. NA Not available.

[1] Table includes data available through April 30, 2009.

[2] More industrial minerals companies are listed in the Industrial Minerals Directory, 2008.

[3] In addition to producing arsenic as a byproduct of chemical manufacturing and gallium as a byproduct of aluminum production, PPM Pure Metals GmbH produces small quantities of germanium as a byproduct of processing imported ores and concentrates and small quantities of indium and tellurium as byproducts of zinc metal production by PPM's parent company, Recylex S.A.

[4] Annually, approximately 40% of total production of zinc metal at this refinery is from secondary materials.

[5] Closed in 2006.

THE MINERAL INDUSTRY OF GREECE

By Harold R. Newman

The mineral industry, which consisted of the sectors that mine and process metallic and nonmetallic minerals and mineral fuels, was a small but important segment of the economy of Greece. Most of the Greek companies that dealt in metals fabrication, mining of industrial minerals, or refined metals production or processing were well-established and had a strong export orientation. Greece's estimated exports in 2007 totaled $23.9 billion, which included petroleum refined products, $1.5 billion; aluminum ores and concentrates, including alumina, $152 million; nonferrous base metal waste and scrap, $57 million; and liquefied propane, $43 million (Index Mundi, 2007).

Minerals in the National Economy

The metallic minerals sector involved a relatively small number of large capital-intensive companies that were, in some cases, vertically integrated and engaged in both mining and metallurgical processing. The industrial minerals sector was more prominent in the national economy than was the metals sector owing to the value of industrial mineral exports. A relatively small industrial base, lack of adequate investment, and the distance from European Union (EU) markets have tended to restrict the export potential of the country.

Production

Production of mineral commodities in Greece was closely tied to the export market. About 50% of the country's mineral production was exported. In terms of the value of production, bauxite was the most important of Greece's mineral commodities. The country also had some deposits of chromite, gold, lead, nickel, and zinc. Aluminum and steel were the only metals produced in Greece. Steel was produced mostly from imported scrap. The country also produced lignite coal and petroleum.

In 2007, Greece was estimated to have produced about 9% of the world's bentonite, slightly more than 3% of the world's magnesite, and more than 1% of the world's bauxite and nickel. It was the world's leading producer of perlite and the second ranked producer of pumice (Bolen, 2008; Bray, 2008; Kramer, 2008; Kuck, 2008).

The country's mineral production levels were more or less the same as in 2006 with a small increase in production of alumina, nickel, and steel in 2007. These changes were related mostly to changes in demand for those particular commodities (table 1).

Structure of the Mineral Industry

The major mineral commodities and the companies that produced them in 2007 are listed in table 2. The structure of the mineral industry changed little from that of 2006. The companies were privately owned, with Government ownership limited to the energy sector.

Commodity Review

Metals

Bauxite and Alumina.—Greece was a leading bauxite producer in the EU, and S&B Industrial Minerals S.A. controlled most of the significant bauxite reserves in Greece. Bauxite is the principal raw material used in the production of alumina, which is the major source of aluminum. The major bauxite deposits are located in central Greece within the Parnassos-Ghiona geotectonic zone and on Evoia Island. Greece's estimated 100 million metric tons (Mt) of bauxite reserves were of boehmitic and diasporic type. Although the bauxite ore had an average aluminum oxide content of 53%, it also had a high silica content that made it hard to process (S&B Industrial Minerals S.A., 2007a).

Gold.—European Goldfields Ltd. completed the acquisition of an additional 30% interest in Hellas Gold S.A., which owned three gold and base-metal deposits in northern Greece. These were the Olympias deposit, which contained gold, lead, silver, and zinc; the Skouries copper/gold deposit; and the polymetallic Stratoni deposit. In 2007 European Goldfields' total interest in Hellas Gold was 95% (European Goldfields Ltd., 2007a).

European Goldfields announced the sale of 50,000 metric tons (t) of gold-bearing pyrite concentrates (from a stockpile of material previously produced from the Olympias Mine) to Celtic Resources Holding plc. This was in addition to the 9,000 t of concentrates sold to Celtic Resources in November 2006.

Lead and Zinc.—The total estimated proven and probable reserves at Stratoni in 2006 were 1.9 Mt at grades of 8.1% lead and 10.8% zinc. Production of ore was expected to reach 170,000 metric tons per year (t/yr) by 2007 and to increase to 400,000 t/yr by 2010. Based on historical production levels, the Stratoni Mine was expected to produce at grades of between 8% and 10% lead and between 8% and 10% zinc, with a rate of recovery for concentrator metals of about 90% (European Goldfields Ltd., 2007b).

Nickel.—Larco G.M.M.S.A. was among the leading ferronickel producers in the world and, of those countries in Europe that used domestic nickel ores, it was a leading producer of nickel. Larco had three main mines—the Evia open pit, which had an annual production of about 1.5 Mt of ore; the Agios Ioannis underground mine, which produced about 700,000 t/yr of ore; and the Kastoria open pit, which produced about 300,000 t/yr of ore. The Larymna metallurgical plant consisted of four rotary kilns, five electric arc furnaces, and two converters and had a total capacity of 25,000 t/yr (Larco G.M.M.S.A., 2007).

Industrial Minerals

Bentonite.—S&B was the leading bentonite producer in Europe with sales of more than 1 million metric tons per year (Mt/yr); it was also the world's second ranked bentonite producer after the United States. S&B remained focused on supplying bentonite for foundries and the drilling industry. S&B mined bentonite from its reserves on the Island of Milos and produced about 85% of total Greek bentonite output (Invest in Greece Agency, 2007).

Cement.—Heracles General Cement S.A., which was a subsidiary of the Lafarge Group of France, owned three cement plants and was the leading processor of carbonate material and the leading producer of cement and clinker in Greece. The company had one plant in Volos, which was the largest-capacity cement plant in Europe (4.6 Mt/yr), one plant in Halkis Evia, and one plant in Milaki Evia. The total combined production capacity of the three plants was 9.6 Mt/yr.

Lafarge announced the acquisition of the National Bank of Greece's 26% interest (18.5 million shares) in Heracles at a price of €321.6 million ($418.9 million[1]). As a result of this transaction, Lafarge increased its ownership in Heracles to 78.7% in 2007 from 52.7% in 2006 (Global Cement Magazine, 2007).

Gypsum.—Lava Mining and Quarrying Co.'s gypsum quarry is located at Altsi on the Island of Crete. Quarrying was carried out using explosives, and the quarried material was then fed to trucks by means loaders and transported to the crushing plant. The production capacity of the quarry was 500,000 t/yr. The end product that came from the plant consisted of anhydrite and hydrous gypsum that was used in the production of cement (Lava Mining and Quarrying Co., 2007a).

Magnesium.—Grecian Magnesite S.A. (GM) was the leading magnesite producer and exporter in the EU and ranked among the leading magnesia producers and exporters in the world. More than 90% of its total magnesite output was exported. GM's open pit mine and plant were located southeast of Thessaloniki in the Chalkidiki region. GM extracted about 2.5 Mt/yr to produce 200,000 t/yr of final product. GM produced and marketed caustic calcined magnesite, dead-burned magnesia, and raw magnesite (Industrial Minerals, 2007).

Perlite.—With a production capacity of 650,000 t/yr, S&B was the leading producer of raw perlite worldwide and the leader in the European market for perlite used in building materials, cryogenics, formed products, and horticulture, and as filter aids. More than 90% of S&B's production was exported. S&B mined perlite on Milos Island (S&B Industrial Minerals S.A., 2007b).

Pumice.—Lava Mining and Quarrying Co. was the leading pumice exporter in the world. The company produced pumice from its deposit located on the Island of Yali. The deposit had been formed by volcanic action of the adjacent volcano at Nissiros. Production was about 100,000 t/yr (Lava Mining and Quarrying Co., 2007b).

Stone, Dimension.—Quarries of marble were located all around Greece, both on the mainland and the islands. The marble industry was active in the quarrying, processing, and sale of blocks and finished products. More than 60 different marble types in many colors (ash, black, brown, green, pink, red, and multicolored) were available. The Greek marble industry continued to play a leading role in the international market with the export of blocks, slabs, and tiles (Greekmarble.eu Guide, 2007).

Mineral Fuels and Other Sources of Energy

Coal.—Lignite (brown coal) is Greece's only significant fossil fuel resource, with estimated reserves of 3,900 Mt. Public Power Corp. (PPC) was Greece's major producer of lignite, which was the predominant fuel used in electricity generation in Greece. Most PPC lignite was produced from the Ptolemais-Amyntaion Basin; lesser amounts were produced from the Megalopolis Basin. Because the country has no anthracite or bituminous coal reserves, it imported hard coal from, in descending order of amount imported, South Africa, Russia, Venezuela, and Colombia. Lignite accounted for about 65% of the raw material for the country's power generation (U.S. Energy Information Administration, 2007).

Natural Gas and Petroleum.—With Greece's limited natural gas reserves and petroleum resources, production was negligible. Its Mediterranean location, however, makes it conveniently close to several important producing regions, such as the Caspian Sea area, the Middle East, and North Africa, which supply its energy requirements.

The Governments of Greece and Turkey agreed to initiate construction of a $440 million natural gas pipeline to the Caspian region; the gas would then be transported from the Caspian region through Greece, Italy, and Turkey to the EU. The 300-kilometer pipeline would provide the EU with its first supply of natural gas from the Caspian region. The pipeline would link the Greek and the Turkish networks and eventually carry gas from Azerbaijan to Italy. Initially, 750 million cubic meters per year of Azerbaijani natural gas would be exported to Greece (Alexander's Gas & Oil Connections, 2007).

Motor Oil (Hellas) Corinth Refineries S.A. announced that it was proceeding with the construction of a new crude distillation unit, which would have a capacity of about 60,000 barrels per day (bbl/d). The project was part of the company's ongoing refinery expansion program. When installation of the new unit is completed, the total refinery capacity will be 170,000 bbl/d. The company also expected additional benefits from the use of its own-produced straight-run fuel oil, from the optimization of crude supply, and from the ability to process new types of crude oil (Capital Link Inc., 2007).

Renewable Energy.—In order for the country to meet EU mandates, renewable electricity generation projects were on the rise in Greece. The Government was developing procedures for the licensing of electricity production from renewable energy sources and high-performance heating electricity coproduction. This was another step towards implementing a new energy policy and offering more access to renewable energy sources in the country's energy balance. Investments in renewable energy sources projects were expected to total €2.5 billion ($3.35 billion) by 2010 (Power Engineering, 2007).

Outlook

Greece is expected to remain a major supplier of industrial minerals to the international market. Mineral exploration activities in Greece will be intensified to secure additional high-quality reserves of various minerals. The Government is expected be involved in planning investment programs to improve the existing installations and lower operating costs. The development of renewable energy sources will continue to be emphasized.

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[1] Where necessary, values have been converted from European Union euros (€) to U.S. dollars (US$) at a rate of €0.77=US$1.00.

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TABLE 1
GREECE: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007[e]
METALS						
Aluminum:						
Bauxite		2,442,312	2,396,065	2,441,443	2,162,900	2,160,000
Alumina, Al_2O_3		758,800	786,000	782,000	775,000 [e]	780,000
Metal:						
Primary		167,797	167,300	163,286	164,800	166,300 [3]
Secondary[e]		3,000	3,000	3,000	3,000	3,000
Chromite:						
Ore, crude:		1,590	1,568	1,477	1,450	1,400
Iron and steel:						
Iron ore and concentrate, nickeliferous, Fe content[e]		600,000	575,000	575,000	575,000	575,000
Metal:						
Steel, crude		1,701,000	1,967,000	2,266,000	2,416,000	2,550,000
Ferroalloys, ferronickel, gross weight		95,376	95,230	102,162	100,000 [e]	100,000
Lead:[e]						
Mine output, Pb content		2,000	--	3,000	10,500	15,000
Metal, secondary	thousand metric tons	4 [3]	4	4	4	4
Manganese:[e]						
Ore, crude:						
Gross weight		100	100	100	100	100
Mn content		15	15	15	15	15
Concentrate:						
Gross weight		20	20	20	20	20
Mn content		15	15	15	15	15
Nickel:						
Ore:						
Gross weight[e]	thousand metric tons	2,700	2,700	2,800	2,700	2,700
Ni content of nickeliferous iron ore		21,410	21,700	23,210	21,670	21,200
Metal, Ni content of ferronickel		18,000 [e]	18,115	19,235	17,700	18,000
Silver, mine output, Ag content	kilograms	79,200	--	2,300	25,900	38,300
Zinc, mine output, Zn content by analysis		30,400	-- [e]	1,300	16,414	18,000
INDUSTRIAL MINERALS						
Abrasives, natural emery[e]		8,000 [3]	8,000	8,000	8,000	8,000
Barite, concentrate[e]		100	50	30	--	--
Cement, hydraulic	thousand metric tons	14,638	15,039	15,166	15,000 [e]	15,000
Clays:						
Bentonite:						
Crude		1,156,642	1,030,556	1,124,795	1,125,000	950,000
Processed		10,835	8,606	2,450	2,500 [e]	2,500
Kaolin:						
Crude		59,680	53,438	49,912	50,000 [e]	60,000
Processed[e]		300	300	300	300	300
Feldspar		102,800	88,274	100,586	100,000 [e]	100,000
Gypsum and anhydrite		731,785	856,606	865,216	865,000 [e]	865,000
Magnesite:						
Crude		549,049	499,474	475,670	500,000 [e]	500,000
Dead-burned		43,713	50,813	58,089	58,000 [e]	58,000
Caustic-calcined		98,357	89,095	68,065	70,000 [e]	70,000
Huntite, crude[e]		18,000	18,000	18,000	18,000	18,000
Nitrogen, N content of ammonia		123,300	131,500	130,000	130,000 [e]	130,000
Perlite:						
Crude		1,079,036	1,053,388	1,075,129	1,100,000 [e]	1,100,000
Screened		739,729	525,000 [e]	550,000	550,000 [e]	550,000
Pozzolan, Santorin earth		1,383,546	1,255,590	1,458,850	1,500,000 [e]	1,500,000

See footnotes at end of table.

TABLE 1—Continued
GREECE: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007[e]
INDUSTRIAL MINERALS—Continued						
Pumice		893,000	835,000	852,000	850,000	900,000
Salt, all types		192,161	187,522	198,024	195,000	195,000
Silica[e]		130,000	125,000	125,000	125,000	125,000
Sodium compounds:[e]						
Carbonate		750	750	750	750	750
Sulfate		5,000	5,000	5,000	5,000	5,000
Stone:[e]						
Dolomite		90,000	40,000	60,000	60,000	60,000
Marble	cubic meters	233,436 [3]	144,860 [3]	151,180 [3]	150,000	150,000
Flysch		75,000	158,887 [3]	93,509 [3]	95,000	95,000
Quartz, microcrystalline	thousand metric tons	150	150	150	150	150
Sulfur:[e]						
S content of pyrites		9,500	9,500	9,500	9,500	9,000
Byproduct, natural gas and petroleum		162,000	160,000	160,000	160,000	150,000
Talc and steatite		500	200	250	250	200
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Lignite	thousand metric tons	69,411	71,237	73,585	74,000 [e]	74,000
Lignite briquets[e]		32,000	35,000	36,000	36,000	36,000
Gas:[e]						
Manufactured, gasworks	million cubic meters	15	15	15	15	15
Natural	do.	36	23	16	16	16
Natural gas plant liquids	thousand 42-gallon barrels	350	140	140 [e]	140	140
Petroleum:						
Crude	do.	1,026	997	756	760 [e]	760
Refinery products:						
Liquefied petroleum gas[e]	do.	8,932 [3]	8,900	8,900	8,900	8,900
Gasoline	do.	32,725	33,150	32,725	32,000 [e]	32,000
Naphtha	do.	7,905	8,245	8,330	8,400	8,400
Mineral jelly and wax[e]	do.	20	20	20	20 [e]	20
Jet fuel	do.	14,400	15,600	16,000	16,000 [e]	16,000
Kerosene	do.	116	116 [e]	132	130 [e]	130
Distillate fuel oil	do.	41,776	42,522	43,268	42,000 [e]	42,000
Refinery gas	do.	3,710	4,200	4,900	4,800 [e]	4,800
Lubricants	do.	1,260	1,225	1,260	1,200 [e]	1,200
Residual fuel oil	do.	49,617	49,950	50,616	50,000 [e]	50,000
Bitumen	do.	3,151	3,100	3,121	3,000 [e]	3,000
Petroleum coke	do.	880	935	990	1,000 [e]	1,000
Other	do.	756	770	980	900 [e]	900
Refinery fuel and losses	do.	7,490	7,490	7,500	7,500 [e]	7,500
Total	do.	172,738	176,223	178,742	176,000 [e]	176,000

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through September 30, 2008.

[2] In addition to the commodities listed, other crude construction materials are produced, but available information is inadequate to make reliable estimates of output.

[3] Reported figure.

TABLE 2
GREECE: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina, Al_2O_3	Aluminium de Grèce S.A. (AdG) (Mytilineos Holdings S.A., 53%)	Agios Nikolaos, Boeotia area	750
Aluminum	do.	do.	160
Asbestos	Hellenic Mineral Mining Co. S.A.	Mines at Zidani, near Kozani	100
Barite, $BaSO_4$	S&B Industrial Minerals, S.A. (Eliopoulos-Kyriakopoulos Group)	Milos Island	1
Bauxite	do.	Mines at Phocis, plants at Phocis and Itea	2,000
Do.	Eleusis Bauxites Mines, S.A.	Mines near Drama, Itea, and Phthiotis-Phocis	300
Do.	do.	Plants in Aghia Marina, Drama, and Itea	400
Do.	Delphi-Distomon S.A.; Hellenic Bauxites of Distomon S.A. (Aluminium de Grèce S.A.)	Beotia and Phokifda mines, Delphi-Distomon area	500
Bentonite:			
Crude	Mediterranean Bentonite Co. S.A. (Industria Chemica Mineraria S.p.A., Italy)	Surface mines on Milos Island	20
Do.	Mykobar Mining Co. S.A. (Silver & Baryte Ores Mining Co. S.A.)	Mines at Adamas, Milos Island	300
Do.	do.	Plants at Adamas, Milos Island	200
Do.	S&B Industrial Minerals, S.A. (Eliopoulos-Kyriakopoulos Group)	Mines at Adamas, Milos Island	600
Processed	do.	Plant at Voudia Bay, Milos Island	400
Cement	Halkis Cement Co. S.A. (Lafarge Group)	Micro-Vathi plant, west-central Euboea Island	3,000
Do.	Halyps Cement S.A. (Ciments Français)	Paralia Aspropyrgos plant, Athens	800
Do.	Heracles General Cement S.A. (Lafarge Group)	Plants at Halkis Evia, Milaki Evia, and Volos	9,600
Do.	Titan Cement Co. S.A.	Elefsis plant, Athens area	400
Do.	do.	Kamari plant, Boeotia	2,600
Do.	do.	Patras plant, northern Peloponnesus	1,900
Do.	do.	Salonica plant, Salonica	1,650
Ferroalloys, ferronickel, Ni content	Larco G.M.M. S.A.	Larymna metallurgical plant	25
Gold, Au in concentrate kilograms	Hellas Gold S.A. (European Goldfields Ltd.)	Kassandra Mines (Olympias and Stratoni)	5,000
Gypsum	Lava Mining and Quarrying Co. S.A.	Altsi, Crete Island	500
Do.	Titan Cement Co. S.A.	do.	280
Hunite/hydromagnesite	Microfine S.A.	Mines in Kozani Basin	100
Lead, mine, Pb in concentrate	Hellas Gold S.A. (European Goldfields Ltd.)	Kassandra Mines (Olympias and Stratoni), northeastern Chalkidike	30
Lignite	Public Power Corp. (PPC) (Government)	Aliveri Mine, Euboea Island	420
Do.	do.	Megalopolis Mine, central Peloponnesus	7,000
Do.	do.	Ptolemais Mine, near Kozani	28,000
Magnesite, concentrate	Grecian Magnesite S.A. (GM)	Mine and plant at Gerakini and Kalives, Chalkidiki, northern Greece	200
Manganese, battery-grade MnO_2	Eleusis Bauxite Mines Mining, Industrial and Shipping S.A. [National Bank of Greece (OAE)]	Nevrokopi, Drama	10
Marble, slab cubic meters	Aghia Marina Marble Ltd.	Pallini	100,000
Do. do.	Chris G. Karantanis & Sons Co.	Korinthos	60,000
Natural gas million cubic meters per day	Public Petroleum Corp. (PPC) (Government)	Prinos offshore gasfield and oilfield, east of Thasos Island	125
Nickel, ore	Larco G.M.M. S.A.	Agios Ioannis Mine, near Larymna	700
Do.	do.	Evia Mine, near Larymna	1,500
Nitrogen, N content of ammonia	Phosphoric Fertilizers S.A.	Nea Karvall	150

See footnote at end of table.

TABLE 2—Continued
GREECE: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Perlite		S&B Industrial Minerals, S.A. (Eliopoulos-Kyriakopoulos Group)	Mines on Kos and Milos Islands; plant at Pireaus	650
Do.		Otavi Minen Hellas S.A. (Otavi Minen AG, Germany)	Milos Island	150
Do.		Bouras Co.	Kos Island	50
Petroleum, refined	42-gallon barrels per day	Hellenic Aspropyrgos Refinery S.A.	Aspropyrgos	95,000
Do.	do.	Motor Oil (Hellas) Corinth Refineries S.A.	Aghii Theodori, Corinth	170,000
Do.	do.	Petrola Hellas S.A.	Eleusis	100,000
Do.	do.	Thessaloniki Refining Co. A.E.	Thessaloniki	76,000
Pozzolan (Santorin earth)		Lava Mining and Quarrying Co. (Heracles General Cement Co. S.A.)	Xylokeratia, Milos Island	600
Do.		Titan Cement Co. S.A.	do.	300
Pumice		Lava Mining and Quarrying Co. (Heracles General Cement Co.)	Yali Island	100
Quartz (microcrystalline)		do.	Adamas, Milos Island	150
Steel, crude		Halyvourgia Thessalias S.A. (Manessis Bros. and Voyatzis S.A., 65%, and National Investment Bank for Industrial Development, 35%)	Steelworks at Volos	1,500
Do.		Sidenor Steel Products Manufacturing S.A.	Steelworks at Thessaalonili and Almyros	2,800
Do.		Halyvourgiki, Inc.	Steelworks at Eleusis	1,200
Do.		Hellenic Steel Co.	Steelworks at Thessaloniki	1,000
Do.		Corinth Pipeworks S.A. (CPW)	Steelworks at Thisvi	700
Zeolite		S&B Industrial Minerals, S.A. (Eliopoulos - Kyriakopoulos Group)	Mine at Pendalofos; plant at Ritsona	100
Zinc, mine, Zn in concentrate		Hellas Gold S.A. (European Goldfields Ltd.)	Kassandra Mines (Olympias and Stratoni), northeastern Chalkidike	30

Do., do. Ditto.

THE MINERAL INDUSTRY OF HUNGARY

By Mark Brininstool

Hungary continued to be a modest producer of minerals in 2007; bauxite was the only mineral product that was significant in terms of European production. Overall, mineral production decreased in 2007 compared with production in 2006, and Hungary's dependence on imported mineral fuels continued.

Minerals in the National Economy

In 2007, Hungary's gross domestic product (GDP) increased by 1.3% compared with the GDP in 2006. Industrial production accounted for 25.3% of the GDP in 2007. Basic metals (7.6%), the manufacture of coke and refined petroleum products (6%), industrial mineral products (2.8%), and mining and quarrying (.3%) together made up about 17% of industrial production, which was approximately the same proportion as in 2006 (Hungarian Central Statistical Office, 2008, p. 22, 25).

Minerals and mineral products played a significant role in Hungary's trade balance in 2007. The Hungarian Central Statistical Office reported that mineral products was the third largest import category in terms of dollar value and accounted for about $3.9 billion worth of imports in 2007. Mineral fuels, mineral oils, and distilled products made up 95% of the value of mineral product imports. Base metals and articles of base metals was the fourth largest import category, with a value of $3.6 billion. Exports of mineral products were valued at $746 million in 2007, and exports of base metals and articles of base metals were valued at $2.2 billion (Hungarian Central Statistical Office, 2009).

Government Policies and Programs

Act XLVIII of 1993 on Mining (The Mining Act) forms the basis for the legal structure that governs mining in Hungary. The Ministry of Environmental Protection and the Hungarian Mining Office enforce existing environmental laws and regulations.

Production

Hungary produced a fairly wide range of minerals in 2007, but it was not a significant world producer of any mineral. In terms of European production, Hungary was significant only in bauxite production. Production decreased for most minerals in 2007, most notably for primary aluminum, industrial minerals, and natural gas. Only crude steel, gas oil, and peat were reported to have significant increases in production (table 1).

Structure of the Mineral Industry

Table 2 is a list of the major mineral industry facilities.

Commodity Review

Metals

Bauxite and Alumina and Aluminum.—Bauxite production rose by 1.5% compared with that of 2006 (table 1). In January 2006, Magyar Aluminium Ltd. (MAL), which was the only producer of bauxite, alumina, and aluminum in Hungary, had begun the process of shutting down its aluminum smelter at Inota and opening two new scrap-metal furnaces. Higher electricity costs were cited as the reason for the closure of the Inota smelter, and MAL planned to continue regular production of aluminum semimanufactures by purchasing primary aluminum and aluminum scrap. The Inota smelter was sold in June 2007 to INOTAL Aluminium Processing Ltd. (Magyar Aluminium Ltd., 2005, 2009).

Primary aluminum production was likely halted in 2007 because of the closure of the Inota smelter, but this could not be verified because production figures were not reported. Production is likely to resume at a reduced level if INOTAL is able to reopen the plant. Future production of secondary aluminum metal could also increase as a result of operations at MAL's two new scrap-metal furnaces.

Gallium.—Gallium is a byproduct of the processing of bauxite and zinc ores, and very few countries in the world produce gallium. Only 80 metric tons (t) was estimated to have been produced worldwide in 2007, and Hungary accounted for 7.5% of this production (Kramer, 2008).

Gold.—No gold was produced in Hungary in 2007. Carpathian Gold Inc. continued exploratory activities on its Fuzzerrandvany Concession and Kanazsvar License in the Tokaj Mountains and the Matra Mountains, respectively, in northeastern Hungary. The company made no announcements of important discoveries but indicated that it planned to continue exploration activities in 2008 (Carpathian Gold Inc., 2008, p. 7).

Iron and Steel.—Crude steel and pig iron production in Hungary increased by about 8% and 4%, respectively, compared with 2006 production (table 1). Hungary's leading steel producer, ISD Dunaferr Co. Ltd., invested 50 billion forint (Ft) ($272 million[1]) in 2007 to increase production capacity and to improve quality at its various operations. One of the biggest investments was made in the company's hot-rolling mill in Dunaujvaros to expand the mill's capacity to 3 million metric tons per year (Mt/yr) (ISD Dunaferr Co. Ltd., 2008).

Industrial Minerals

Hungary produced such industrial minerals as aggregates, clays, gypsum and anhydrite, and perlite. Production of most industrial minerals decreased in 2007. Notably, kaolin production decreased by 57%; common sand, by 54%; raw bentonite, by 18%; gravel, by 15%; gypsum and anhydrite, by 13%; and cement, by 4.6% (table 1). The reduction in industrial mineral manufacturing was most likely related to the 12% decline in construction in 2007 as the pace of road construction projects slowed (Hungarian Central Statistical Office, 2008, p. 2).

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[1] Where necessary, values have been converted from Hungarian forint (Ft) to U.S. dollars (US$) at the rate of Ft183.83=US$1.00.

Mineral Fuels

Production of fuel oil manufacturing decreased by 45% compared with that of 2006; natural gas production, by 18%; brown coal, by 7%; and crude petroleum, by 5%. Peat production increased by 16% and gas oil production increased by 7%.

Hungary was dependent on imports of oil and gas from Russia to supply the majority of its energy needs, which had a negative impact on Hungary's trade balance and energy security. Hungary's only natural gas pipeline operator, FGSZ Natural Gas Transmission Closed Co. Ltd. by Shares (FGSZ Ltd.), reported 7.89 billion cubic meters (278.7 billion cubic feet) of gas imported through the Druzhba pipeline that entered Hungary from Ukraine at Beregdaroc, and 2.61 billion cubic meters (92.2 billion cubic feet) of natural gas imported through the Hungarian-Austrian Gas (HAG) pipeline (FGSZ Natural Gas Transmission Closed Co. Ltd. by Shares, 2008, p. 14).

Oil and gas exploration projects in Hungary continued in 2007. Ascent Resources plc announced the signing of a partnership agreement with Hungarian Oil and Gas Co. (MOL) to redevelop the Bajcsa gasfield in southwestern Hungary. The partnership was arranged through Hungarian company ZalaGasCo kft, which was 77.46% owned by Ascent. Remaining infrastructure from previous projects at the site was expected to allow new wells to begin operating soon after permits were finalized. Ascent also became a joint technical operator in an exploration project at Szolnok in central Hungary after purchasing a 27.5% interest in the project. The second technical operator was Toreador Hungary Ltd., which owned a 25% interest in the project. Ascent expected to begin drilling two exploration wells after seismic acquisition was completed (Ascent Resources plc, 2008, p. 14-15).

Falcon Oil and Gas Ltd., through its operating subsidiary TXM Oil and Gas LLC, was also active in exploration activities in Hungary. In May, the company announced that it had been granted a long-term production license for a basin-centered gas accumulation (BCGA) in southeastern Hungary and expected to proceed with plans for development of the BCGA (Falcon Oil and Gas Ltd., 2007).

Outlook

Hungary's dependence on imported minerals will likely continue in the metals and mineral fuels sectors even if slight production gains are made as a result of exploration and investment. Production of industrial minerals will likely be affected by developments in the domestic construction industry, and production could also increase if road projects and other infrastructure projects accelerate.

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TABLE 1
HUNGARY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
METALS						
Aluminum:						
Bauxite, gross weight	thousand metric tons	666	647	535	538	546
Alumina, gross weight, calcined basis	do.	300	300	270	270	270 [e]
Metal:						
Primary		34,000 [e]	34,400	31,000	34,400	--
Secondary[e]		50,000	50,000	50,000	50,000	50,000
Total		84,000	84,400	81,000	84,400	50,000
Gallium[e]	kilograms	5,500 [3]	5,500	5,500	5,500 [3]	6,000
Iron and steel, metal:						
Pig iron	thousand metric tons	1,333	1,350	1,329	1,335	1,394
Ferroalloys[e, 4]		8,000	8,000	8,000	8,000	8,000
Steel:						
Crude	thousand metric tons	2,045 [r]	1,944 [r]	2,005 [r]	2,144 [r]	2,317
Semimanufactures, rolled only[e]	do.	1,803 [3]	1,844 [3]	1,850	2,000 [r]	2,100
Manganese ore:						
Run-of-mine:						
Gross weight		48,000	49,000	50,000	50,000	51,000
Mn content[e]		12,500	13,200	13,500	13,350 [r, 3]	13,464 [3]
Concentrate:[e]						
Gross weight		15,000	15,000	15,000	15,000	15,000
Mn content		5,000	5,000	5,000	5,000	5,000
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand metric tons	3,573	3,580	3,371 [r]	3,724 [r]	3,552
Clays:						
Bentonite:						
Raw		5,770 [r]	6,449 [r]	9,000	6,600	5,400
Processed[e]		42,000	3,700 [3]	3,700	2,500	2,250
Kaolin, raw and washed		13,250	7,530	7,000	7,000	3,000
Gypsum and anhydrite		62,000	62,000 [r]	55,000	30,000	26,000
Lime, calcined[e]	thousand metric tons	500	500	500	500	500
Nitrogen, N content of ammonia[e]	do.	232 [3]	274 [3]	275	275	300
Perlite		59,530	65,100	65,000	71,000	67,000
Sand and gravel:						
Gravel	thousand metric tons	35,000 [e]	33,544	33,500	34,483	29,400
Sand:						
Common	do.	12,000 [e]	12,500 [e]	12,800	11,634	5,400
Foundry		162,600	138,200	138,000	120,000	117,000
Glass		225,300	163,900	164,000	251,000	220,000
Stone:						
Dimension, all types[e]	thousand metric tons	5,500	5,000	5,000	5,000	5,000
Dolomite	do.	4,398	7,200	7,200 [e]	8,142 [r]	6,270
Limestone	do.	2,459	3,014	3,014	3,517 [r]	3,287
Sulfur, byproduct, elemental, all sources[e]		51,000	50,000	50,000	50,000	50,000
Sulfuric acid[e]		73,000 [r, 3]	80,000	80,000	80,000	80,000
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	thousand metric tons	667	260	--	--	--
Brown	do.	4,128	2,495	1,426	1,431	1,331
Lignite	do.	8,564	8,470	8,154	8,467	8,351
Total	do.	13,359	11,225	9,580	9,898	9,682
Coke, metallurgical[e]		650	650	650	650	650
Gas, natural, marketed	million cubic meters	3,145 [r]	3,112 [r]	3,159	3,246	2,653
Peat		NA [r]	NA [r]	NA [r]	77,300 [r, e]	89,500

See footnotes at end of table.

TABLE 1—Continued
HUNGARY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
MINERAL FUELS AND RELATED MATERIALS—Continued						
Petroleum:						
Crude:						
As reported	thousand metric tons	1,133	1,077 r	948	886	839
Converted	thousand 42-gallon barrels	7,580 r	7,205 r	6,342 r	5,927 r	5,613
Refinery:						
Motor fuel (including aviation fuel)	do.	12,478	12,376	11,263	11,637	11,849
Gas oil	do.	23,096	24,663	26,177	25,938	27,751
Fuel oil	do.	2,045	1,758	1,092	1,638	899
Total	do.	37,619 r	38,797 r	38,532 r	39,213 r	40,499

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. NA Not available. -- Zero.

[1] Table includes data available through January 31, 2009.

[2] In addition to the commodities listed, diatomite and a variety of industrial minerals and construction materials, such as common clay and talc, are also produced, but available information is inadequate to make reliable estimates of output.

[3] Reported figure.

[4] Hungary is believed to produce some blast ferromanganese.

TABLE 2
HUNGARY: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina		Magyar Aluminium Ltd. (MAL)	Ajka Timfoldgyar plant, about 120 kilometers southwest of Budapest, near Lake Balaton	400
Do.		do.	Almasfuzito Timfoldgyar plant near the Czech Republic border, 63 kilometers northwest of Budapest	240
Do.		do.	Moson-Magyarovar plant, in northwestern corner of Hungary, about 12 kilometers from Austrian and Czech Republic borders	30
Aluminum, primary		INOTAL Aluminium Processing Ltd.	Inota plant, near Varpalota, 75 kilometers southwest of Budapest	35
Bauxite		Magyar Aluminium Ltd. (MAL) (owns and operates Bakony Bauxite Mines Ltd.)	Bakony District, extending roughly 100 kilometers northeast along Lake Balaton	1,500
Cement		Holcim Hungaria Zrt.	Labatlan and Hejocsaba	2,100
Do.		Belpafatvalvi Cement es Meszipari Rt (Heidelberger & Schwenk and Hungarian Group)	Belapatfalva, near Miskolc, 125 kilometers northeast of Budapest	1,100
Do.		Beremend Cement es Meszipari Rt (Heidelberger & Schwenk, 100%)	Beremend, 45 kilometers south of Pecs	1,090
Do.		Dunai Cement es Meszmu Kft (Heidelberger & Schwenk, 100%)	Vac, 50 kilometers north of Budapest	1,200
Do.		Hejocsabai Cement es Meszipari Rt (Holderbank and Hungarian Group)	Hejoscaba, 150 kilometers northeast of Budapest	1,450
Do.		Labatlani Cementipari kft (Holderbank)	Labatlan, 20 kilometers north of Tatabanya	550
Clays		Agyag-Asvany Kft (Navan Resources PLC)	Felsopeteny, one underground and two open pit mines and a 5,000-metric-ton-per-year processing plant. Products are ball clay, kaolin, and refractory clay	35
Coal:				
Bituminous and lignite		Magyar Szenbanyaszati Troszt (MSZT) (Hungarian Coal Mining Trust)	Tatabanya and Oroszlany coal mining region, 45 kilometers west of Budapest	8,900
Do.		do.	Mecsek coal mining region, near Pecs and Komlo, north of the Croatian border	3,100
Do.		do.	Borsod coal mining region, 130 kilometers northeast of Budapest	5,200
Lignite		do.	Thorez opencast mine at Visonta, 80 kilometers northeast of Budapest	7,000
Manganese		Orszagos Erc-es Asvanybanyak (National Ore and Mineral Mines)	Urkut manganese ore mines, 120 kilometers southwest of Budapest	160
Natural gas	million cubic feet	Hungarian Oil and Gas Co. (MOL)	Szeged and Algyo gasfields, southern Hungary	152,000
Do.		do.	Hajduszoboszo gasfields, 180 kilometers east of Budapest	50,000
Do.		do.	Smaller gasfields are Szank, Kardoskut, Bekes, Berefurdo, and others	39,000
Perlite		Perlit 92 Kft (Navan Resources PLC and Hungarian Group)	Palhaza, northeastern Hungary; open pit mine and processing plant	150
Petroleum:				
Crude	million 42-gallon barrels	Hungarian Oil and Gas Co. (MOL)	Szeged-Algyo Field, near Romanian-Serbian border; 50% of total capacity	7
Refined	do.	Danube Petroleum Refining Co. [subsidiary of Hungarian Oil and Gas Co. (MOL)]	Szazhalombatta	55
Do.	do.	Tisza Petroleum Refining Co. [subsidiary of Hungarian Oil and Gas Co. (MOL)]	Leninavaros	22
Do.	do.	Zala Petroleum Refining Co. [subsidiary of Hungarian Oil and Gas Co. (MOL)]	Zalaegerszeg	4
Silica		Uveg-Asvany Kft. (Navan Resources PLC and Hungarian Group)	Mine and plant at Fehevaresugo	660
Steel, crude		ISD Dunaferr Co. Ltd. (owned by the Ukrainian Industrial Union of Donbass)	Dunaujvaros, 60 kilometers south of Budapest	1,400
Do.		OAM-Ozdi Acelmuvek Kft	120 kilometers northeast of Budapest	360
Do.		DAM-Diosgyori Acelmuvek es Kereskedelmi Kft	Diosgyoer, 145 kilometers northeast of Budapest	850

Do., do. Ditto.

The Mineral Industry of Iceland

By Harold R. Newman

Those industries in Iceland that use substantial amounts of energy, such as aluminum and ferroalloy production, provided about 15% of the country's gross domestic product and consumed about 60% of the electricity produced. The country's aluminum plants and ferroalloy plant relied on imported raw materials and inexpensive geothermal and hydroelectric energy. Iceland accounted for about 1% of global production of primary aluminum and about 1.5% of ferrosilicon production (Bray, 2008; Corathers, 2008).

Iceland's economy was heavily dependent on its export sector. Aluminum and ferrosilicon were the country's leading export commodities. Because of the country's geographic proximity to the European Union and the European Free Trade Association countries, most of Iceland's trade was with Europe. In 2007, marine products accounted for the majority of Iceland's exports of goods (U.S. Department of State, 2007).

Production

Iceland has few proven mineral resources. There were no metals in sufficient quantities to make mining feasible with existing technology. All production of industrial minerals was used by local industries (table 1).

Structure of the Mineral Industry

The majority of shares in the major mineral enterprises, except for aluminum, were held by the Government. The remaining mineral enterprises were either foreign-owned and locally operated, or, in the case of small businesses, locally owned and operated (table 2).

Commodity Review

Metals

Aluminum.—Alcoa Inc. and the Government agreed to begin detailed feasibility studies for the development of a new aluminum smelter, based principally on geothermal energy, at Bakki near Husavik in northern Iceland. Construction of the proposed 250,000-million-metric-ton-per-year (Mt/yr) smelter could possibly start in 2012 (Alcoa Inc., 2007b).

Alcoa announced the opening of its 346,000-metric-ton-per-year (t/yr) Fjardaal smelter in Reydarfjordur in midyear 2007. The project cost about $1.1 billion and was Alcoa's first new greenfield smelter in Iceland in 20 years (Alcoa Inc., 2007a).

Alcoa also announced that it had opened a 280,000-t/yr plant in Mosjoen, Norway, to provide anodes for the Fjardaal smelter in Iceland and the Mosjoen smelter in Norway. Alcoa built the facility with Norwegian partner Elkem Aluminium ANS, which had a 36% share in the Mosjoen anode plant (Alcoa, Inc., 2007a).

Century Aluminum Co. of the United States announced that it was moving forward with plans to build its second smelter in Iceland. A site was selected and an environmental impact assessment had been submitted to the Icelandic National Planning Agency. A feasibility study was underway, and Century was investigating which technology to use in the smelter (Metal Bulletin, 2007).

Mineral Fuels and Other Sources of Energy

Geothermal and Hydroelectric Energy.—The Icelandic National Energy Authority (INEA) signed a memorandum of agreement with EnBW Energie Baden-Wuerttemberg AG of Germany that could lead to electricity being transmitted to Europe along a 1,200-mile seafloor cable. The cable would also be capable of carrying energy to the United Kingdom national grid en route to Germany. An agreement had already been signed with Energie Baden-Wuerttemberg to begin exploratory drilling through Iceland's thin crust. It was estimated that less than one-fifth of Iceland's very large geothermal and hydroelectric resources had been tapped. By drilling more than twice as deep as current practice, each borehole could provide up to 10 times more energy. Special drills would be required to drill into the hottest basalt just above the magma chamber where the rock is verging on the molten magma (Alexander's Gas & Oil Connections, 2007).

Iceland's hydroelectric power generation plants included the Karahnjukar, which, with a capacity of 690 megawatts (MW), was the country's largest plant; the Burfell, which had a 270-MW operating capacity; the Hrauneyjarfoss, which had a 210-MW operating capacity; the Blanda, which had a 150-MW operating capacity; and the Sigalda, which also had a 150-MW operating capacity. Iceland continued to explore the possibility of exporting hydroelectric energy using submarine cable to mainland Europe (U.S. Department of State, 2007).

Petroleum.—The Ministry of Industry announced plans to offer exclusive licenses for petroleum exploration in the Dreki area of the Atlantic Ocean between Iceland and the island of Jan Mayen. The tentative release date was January 2009. The Government stated that seismic surveys and other geophysical measurements indicated that producible quantities of petroleum were possible as they have been found in adjacent and geologically similar areas (Offshore Engineer, 2008).

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TABLE 1
ICELAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
Aluminum, metal, primary[2]		286,022	284,700	273,318	328,424	398,500 [3]
Cement, hydraulic[4]		89,798	100,287	132,438	141,433	140,000
Diatomite		27,513	19,332	3,236	--	--
Ferrosilicon		117,171	119,389	114,844	113,798	114,000
Pumice and related volcanic material:						
Pumice		50,193	36,045	105,454	92,663	95,000
Scoria[e]		1,000	1,000	1,000	1,000	1,000
Salt[e]		4,500	4,600	4,600	4,500	4,500
Sand:[e]						
Basaltic	cubic meters	1,200	1,300	1,300	1,200	1,200
Calcareous, shell	do.	80,000	80,000	80,000	75,000	75,000
Sand and gravel	thousand cubic meters	4,200	4,200	4,300	4,200	4,200
Silica dust[5]		23,830 [3]	22,533 [3]	22,992 [3]	24,955 [3]	25,000
Stone, crushed:[e]						
Basaltic		96,000	96,000	97,000	95,000	95,000
Rhyolite	cubic meters	18,000	19,000	19,000	18,000	18,000

[e] Estimated; estimated data are rounded to no more than three significant digits. do. Ditto. -- Zero.

[1] Table includes data available through September 30, 2008.

[2] Ingot and rolling billet production.

[3] Reported figure.

[4] Sales.

[5] Byproduct of ferrosilicon.

TABLE 2
ICELAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	Alcoa Inc.	Mosjoen	280
Do.	Icelandic Aluminium [ISAL], (Alusuisse-Lonza Holding Ltd., 100%)	Straumsvik	162
Do.	Century Aluminum Co.	Grundartangi	260
Cement	Sementsverksmidja Rikisins (Government, 100%)	Akranes	115
Diatomite	Kisilidjan hf [Diatomite Plant Ltd.] (Government, 98%)	Myvatnssveit	27
Ferrosilicon	Islenska jarnblendifelagid hf [Icelandic Alloys Ltd.] (Government, 55%, and Elkem A/S, 30%)	Plant at Grundartangi	72
Fertilizer	Aburdarverksmidja Rikisins (Government, 100%)	Gufunes	60
Pumice	Hekla Pumice Co.	Mount Hekla	210
Do.	Pumice Products Ltd. (BM Valla Ltd., 100%)	do.	32
Salt	Icelandic Salt Co. (Akzo NV of Netherlands, 58%)	Plant at Svartsengi	5

Do., do. Ditto.

THE MINERAL INDUSTRY OF IRELAND

By Harold R. Newman

Ireland's geology includes lithological units and tectonic features that are favorable for the occurrence of several types of mineral resources, from base metals to industrial minerals. The Carboniferous rocks of the Midlands region were the main focus for exploration and development of Ireland's lead-zinc deposits. Stratabound mineralization was hosted in carbonate units. The high grade of the ore and the shallow occurrence of the deposits resulted in a relatively low cost of exploiting these carbonate-hosted deposits. The continued exploration activity in the lead and zinc sector has resulted in the discovery of new mines and the investigation of other potential projects (Exploration and Mining Division [Ireland], 2007).

Minerals in the National Economy

Ireland is a small, modern, trade-dependent economy with growth that averaged 6% between 1995 and 2007. Exports remained a key component of its gross domestic product (GDP), and minerals accounted for about 1% of its exports. Mining accounted for about 1% of the GDP and about 1% of the work force. Ireland's mineral processing industry was small, as was the domestic demand for mineral products (Link2Exports, 2007).

Production

Ireland remained a major European Union (EU) producer of lead and zinc ore and an important producer of alumina and peat in 2007. Ireland accounted for about 4% of world zinc mine and 2% of world lead production from the following three mines: Anglo American plc's Lisheen lead-zinc mine, Lundin Mining Corp.'s Galmoy lead-zinc mine, and New Boliden AB's Tara lead-zinc mine, which was the leading zinc mine in Europe. These were three of Europe's most modern mines (table 1). Ireland was also one of the world's leading exporters of lead and zinc concentrate (Exploration and Mining Division [Ireland], 2007).

Structure of the Mineral Industry

Ireland's mines and mineral-processing industry were important to the economy of the country. Companies were mostly privately owned. The Geological Survey of Ireland is responsible for the development of minerals information and technical management of the state mineral licensing and leasing system. The major mineral industry facilities and their capacities are listed in table 2.

Commodity Review

Metals

Bauxite and Alumina.—The alumina refinery operated by Aughinish Alumina plc (a subsidiary of Switzerland-based Glencore International AG) was situated on Aughinish Island on the south side of the Shannon estuary near Limerick City. Aughinish Alumina produced about 2 million metric tons of alumina in 2007 by treating bauxite ore using the Bayer process. Most of the bauxite was imported from Guinea, although some was imported from Australia and Brazil (Aughinish Alumina plc, 2007).

Lead and Zinc.—Ireland was the leading producer of zinc ore in Europe and had three major producing mines within the Rathdowney Trend in the Midland Orefield. These operations included the world-class ore bodies at Galmoy, Lisheen, and Navan. Lundin Mining's merger with Arcon International Resources plc created a diversified European base-metal producer with expected aggregate annual zinc production of about 152,000 metric tons (t) and lead production of about 46,000 t.

Minco plc announced that it was continuing to meet with success at the Tobermalug prospect in County Limerick, which was part of Minco's Pallas Green joint venture with Xstrata plc of Switzerland. Minco stated that it had intersected significant grades and widths, including 5.25 meters (m) grading 10.21% zinc and 1.64% lead in its exploration drilling. Drill hole number MN-2529-018 extended mineralization 570 m to the southeast of previous drilling. In 2007, five drilling rigs operated in the vicinity of the Tobermalug prospect. Minco also announced that Minco and Xstrata had agreed on an $8.4 million exploration budget, of which Minco's share would be $2 million (Minco plc, 2007).

Mineral Fuels

Exploration offshore Ireland has never experienced the same level of interest as offshore Norway or the United Kingdom despite similarities of geology. In the past, offshore exploration has not been particularly productive. At yearend 2007, fewer than 160 wells had been drilled on the Irish continental shelf. New studies and a high-profile licensing round, however, were changing perceptions about Ireland's prospectivity.

Natural Gas and Petroleum.—The Government announced terms for new Porcupine Basin oil and gas licensing opportunities and cited the country's dependence (85%) on outside sources for imported natural gas and petroleum as reason for opening the region for exploration. Offering 229 full and 3 partial blocks, the offshore area is located in the west of Ireland in the Porcupine Basin and comprised 63,500 square kilometers (about 15.7 million acres). The biggest change in the exploration terms was in Ireland's new tax regime. A new tax rate was added to the 25% corporate tax rate. Under the new tax system, the most profitable fields will be taxed an additional 15% when the profit rate is in excess of 4.5%, whereas the least profitable fields (those with a profit rate of less than 1.5%) will not be additionally taxed. Fields having a profit rate of 3.0% to 4.5% will be taxed an additional 10%, and fields having a profit rate of 1.5% to 3.0% will be taxed an additional 5% (Rigzone, 2007).

Outlook

Ireland is likely to remain a major EU producer of zinc ore and an important producer of alumina, lead ore, and peat. Exploration activity for additional new mineral resources, with the main emphasis on gold, lead, and zinc, is expected to continue.

The Government announced that it would invest $1.6 million to develop strategic energy infrastructure. Supply security, competitive energy prices, and environmental sustainability are the key priorities. The Government wants to improve its gas interconnection with Scotland, develop a strategic oil storage project to maximize oil stocks, and construct a gas storage facility to help ease supply disruptions. The Government plans to commit $350 million to sustainable energy sources and to invest $193.4 million in energy research. State energy companies are to receive $9.1 million during the next 6 years. Bord Gais Eireann plans to invest $2.6 million on improving gas transmission and constructing a 400-megawatt gas-fired power station. The Government also plans to invest $42.8 million in geosciences research (Oil and Gas Journal, 2007).

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TABLE 1
IRELAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
METALS						
Alumina[e]		1,200	1,400	1,500	1,800 [r]	1,800
Lead:						
Mine output, Pb content	metric tons	50,339	65,915	63,810	61,800	54,100 [2]
Metal, refined, secondary[e]	do.	6,600	19,600	19,992 [2]	21,700 [2]	22,500
Silver, mine output, Ag content	kilograms	6,500	6,300	6,000	4,100 [r]	4,000
Zinc, mine output, Zn content	metric tons	419,041	444,127	428,596	425,756 [r]	400,898 [2]
INDUSTRIAL MINERALS[3]						
Cement, hydraulic[e]		3,830	4,000	4,000	4,700	4,700
Gypsum[e]		500	500	500	700	700
Lime[e]		300	300	300	300	300
Sand and gravel:[e, 4]		12,000	12,000	12,000	12,000	12,000
Stone and other quarry products:[e]						
Limestone	million metric tons	1	1	1	1	1
Other[5]	metric tons	36,000	36,000	36,000	3,600	3,600
MINERAL FUELS AND RELATED MATERIALS						
Gas, natural, marketed[e]	million cubic meters	2,500	2,500	570 [2]	535 [2]	566 [2]
Peat:[6]						
For horticultural use		451	450 [e]	475	500 [e]	500
For fuel use, milled peat[7]		2,739	5,200 [e]	4,100	3,800	3,800
Total		3,190	5,650 [e]	4,575	4,300 [e]	4,300
Briquets		269	284	275	260	300
Petroleum refinery products:[8]						
Liquefied petroleum gas[e]	thousand 42-gallon barrels	657 [2]	500	500	500	500
Naphtha[e]	do.	900	900	900	900	900
Gasoline, motor	do.	5,402	3,946 [r]	4,500 [e]	4,500 [e]	4,500
Distillate fuel oil	do.	7,373	5,337 [r]	8,000 [e]	8,000 [e]	8,000
Residual fuel oil	do.	6,497	6,219 [r]	7,000 [e]	7,000 [e]	7,000
Refinery fuel and losses	do.	913	657 [r]	750 [r]	750 [r, e]	750
Total	do.	21,742	17,559 [e]	21,700 [r, e]	21,700 [r, e]	21,700

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto.

[1] Table includes data available through January 31, 2009.

[2] Reported figure.

[3] Ireland also produces significant quantities of synthetic diamond and is the major supplier to the United States. Output, however, is not quantitatively reported, and general information is inadequate to make reliable estimates of output.

[4] Excludes output by local authorities and road contractors.

[5] Includes clays for cement production, fire clay, granite, marble, rock sand, silica rock, and slate.

[6] Includes production by farmers and by the Bord Na Mona (Government Peat Board).

[7] Includes milled peat used for briquet production.

[8] From imported crude oil.

TABLE 2
IRELAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facility	Annual capacity
Alumina		Aughinish Alumina plc (Glencore International AG)	Aughinish Island, County Limerick	1,500
Cement		Irish Cement Ltd.	Plants in County Limerick and Platin	2,000
Lead-zinc, concentrate		Anglo American plc	Lisheen Mine, County Kilkenny	160
Do.		Arcon International Resources plc (Lundin Mining Corp., 84%)	Galmoy Mine, County Kilkenny	135
Do.		New Boliden AB	Tara Mine, Navan, County Meath	215
Natural gas	million cubic meters	Star Energy Group plc.	Kinsale Head Field, Celtic Sea	2,100
Do.	do.	Ramco Energy plc.	Seven Heads Field, Celtic Sea	50,000
Nitrogen, N content of ammonia		Irish Fertilizer Industries	Plant at Marino Point	450
Peat		Bord Na Mona (Government Peat Board)	Production mainly in the Midlands	4,200
Petroleum, refined	42-gallon barrels per day	Irish National Petroleum Corp. Ltd. (ConocoPhillips Co., 100%)	Whitegate, near Cork	75,000

Do., do. Ditto.

THE MINERAL INDUSTRY OF ITALY

By Alberto Alexander Perez

In 2007, Italy's gross domestic product (GDP) amounted to an estimated $2.1 trillion; the country was the fourth largest economy in the European Union (EU) after Germany, the United Kingdom, and France. Italy's economy was complex and highly developed with industry accounting for about 26.7% of the GDP in 2007, which was a 2.3% decrease from the previous year. Industrial output as a whole was down by 4.3% compared with output in 2006. Heavy industry had facilities for the production of chemicals and iron and steel for automotive assembly and for machine building and metal working. These sectors continued to be heavily dependent on imports of nonfuel minerals and mineral fuels (U.S. Central Intelligence Agency, 2006; Instituto Nazionale di Statistica, 2008).

Minerals in the National Economy

Italy's mineral industry produced such metals as copper, iron and steel, lead, and zinc, all of which were important materials for the country's manufacturing sector. The raw materials used to produce these and other metals were imported ores and concentrates or were obtained from secondary scrap recovery. The country was also highly dependent on imported mineral fuels, although Eni S.P.A. (of which the Government owned a 30% share), was the country's leading petroleum and natural gas company and among the 25 leading energy companies in the world (Petroleum Intelligence Weekly, 2009). Italy was a significant world producer of a variety of industrial minerals, which included cement, clays, feldspar, lime, marble, pumice, and sand and gravel.

Government Policies and Programs

The Government plays a significant role in the economy through regulation of ownership of large financial and industrial companies; privatization and regulatory reform in accordance with EU directives, however, has reduced that role in recent years. Italy's basic mining legislation is mining law No. 1443 of July 29, 1927, which gives subsoil ownership of minerals to the state. The reimbursement of the state by mining concessionaires is regulated by law No. 752 of June 10, 1982. Quarrying operations are regulated by law No. 44 of September 1982.

As a member of the EU, Italy's national environmental policy generally is in full accord with established EU environmental laws and regulations. Disparities in the environmental policies of the two entities, such as the definition of term "waste," persisted, however, and affected Italy's ferrous and nonferrous metals scrap sector (Ferrigno, 2003). Environmental issues in Italy were focused on three main problem areas—air pollution from industrial emissions, such as sulfur dioxide; water pollution of coastal and inland rivers from industrial and agricultural effluents; and such natural hazards as avalanches, landslides, land subsidence in Venice, and volcanic eruptions (U.S. Central Intelligence Agency, 2006).

In the industrial minerals sector, a new legislative decree superseded law No. 748/1984. The new law stipulates that the standards for all domestic Italian mineral fertilizer grades are to be replaced with EU standards. Compulsory registration of fertilizer producers and products is specified in the legislation (Fertilizer Week, 2006).

Production

In 2007, the iron and steel sector reported mixed results; the production of pig iron decreased slightly to 11.1 million metric tons (Mt) and the production of crude steel increased to 31.99 Mt, which was a decrease of about 4% and an increase of about 1.1%, respectively, compared with output levels in 2006. During the same period, output in the nonferrous metals sector also was mixed; aluminum production [848,100 metric tons (t)] and copper production (28,600 t) decreased by about 1.3% and 21%, respectively, compared with that of 2006. The output of mined lead remained static whereas that of refined lead metal increased by about 10%. Zinc metal declined slightly to about 100,000 t. In the industrial minerals sector, cement output increased by about 10% compared with that of 2006. Among mineral fuels, natural gas production decreased by 19% whereas petroleum production increased slightly (table 1).

Structure of the Mineral Industry

Private and mixed public and private entities were the principal owners of Italy's mineral industry. Full Government (public) ownership continued mainly in the mineral fuels sector (table 2).

Mineral Trade

In 2006 (the latest year for which foreign trade data were available), Italy's trade was mainly with other member-countries of the EU. The country's total exports amounted to slightly less than €327 billion[1] ($430 billion) and those to the EU amounted to more than €190 billion ($250 billion) and accounted for about 58.1% of total exports. Its exports increased by 8.5% from the previous year. Its total imports amounted to €348 billion ($458 billion), and imports from the EU amounted to about €192.5 billion ($253 billion) and accounted for about 55.3% of total imports. As a percentage of total exports, the value of fuel and nonfuel minerals constituted about 0.3%, or €1.08 billion ($1.42 billion). Fuel and nonfuel minerals, however, accounted for more than 15.9% of the value of total imports. Among imports of mineral fuels and related material, natural gas and oil imports amounted to more than €50 billion ($66 billion), which was an increase of about 22.9% compared with those of the previous year and constituted about 96% of total imports in this category. Italy's net trade balance of nonmetallic minerals was a positive exchange of €6.1 billion ($8 billion), and that of metals and metal products, a negative exchange of €5.7 billion ($7.5 billion) (Instituto Nazionale di Statistica, 2007).

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[1] Values have been converted from European euros (€) to U.S. dollars (US$) at a rate of €0.76=US$1.00 for 2006.

Commodity Review

Metals

Aluminum and Bauxite and Alumina.—In 2007, Italy's total output of primary and secondary aluminum decreased by about 1.3%, with secondary production remaining practically unchanged and primary production decreasing by 6% (table 1). The country's chief producers of alumina and primary aluminum were Alcoa Italia S.p.A. and Eurallumina S.p.A. (table 2).

Copper.—KME Group S.p.A. (a major European refiner and fabricator of copper that was headquartered in Florence) conducted its operations in Italy at Barga and at Scrivia under its subsidiary EuropaMetalli-LMI S.p.A. Copper and copper semimanufactures were the main products at these locations. Italy imported small amounts of copper concentrate and relied mainly on imports and scrap recovery.

Iron and Steel.—Italy remained a major European producer and consumer of pig iron and crude and finished steels. In 2007, the production of pig iron decreased slightly (by about 4% compared with output in 2006) to 11.1 Mt, and the production of crude steel increased by about 1.1% to 31.99 Mt (table 1). In 2007, Italy produced its highest production ever, which placed the country as the third ranked pig iron producer in the EU after Germany and France, and the second ranked producer of crude steel after Germany. Italy's apparent consumption of crude steel continued to rank the country second in Europe [excluding the Commonwealth of Independent States (CIS)] after Germany (International Iron and Steel Institute, 2006, p. 3, 10, 77, 80, 83).

Lead and Zinc.—In 2007, Italy's mine output of lead remained static whereas that of zinc metal decreased slightly to about 100,000 t. Domestic mine production of lead and zinc was not sufficient to meet demand, and the country imported most of its requirements for lead and zinc concentrates; a minor amount of lead and zinc concentrate, however, was produced in Sardinia. Glencore International AG of Switzerland remained the country's principal processor (smelter and refiner) of lead and zinc (table 2).

Industrial Minerals

In 2007, Italy remained a leading European and global producer of such industrial minerals as bromine (among the top 13 world producers), pumice (25% of world output), feldspar (25% of world output), bentonite (4% of world output), lime (2% of world output), cement (1.7% of world output), and gypsum (1% of world output) (Bolen, 2008; Jasinski, 2008; Miller, 2008; Olson, 2008; Potter, 2008; van Oss, 2008; Virta, 2008). Domestic resources of several industrial minerals were insufficient to meet domestic demand and had to be imported; these included ball clay and barite (supplied mainly from Ukraine), chamotte (Germany), fluorspar (China), kaolin (United States), magnesite (Turkey), mica (China), and talc (China) (Wilson, 2007).

Pumice and Pumicite.—In December 2006, Pumex S.p.A., which was the world's leading producer of pumice and pumice products, reportedly ceased mining operations. Pumex operations were located in Lipari off the northwest coast of Sicily—an island that in 2000 became part of the Aeolian island group that was declared a World Heritage Site by the United Nations Educational, Scientific, and Cultural Organization (UNESCO). Company spokespersons indicated that operations were to continue through processing stocks, which would be sufficient for about 12 months. Mining operations would resume when inconsistencies between commercial and environmental policies were resolved (Industrial Minerals, 2007).

Mineral Fuels and Other Sources of Energy

Natural Gas and Petroleum.—In 2007, Italy's output of natural gas decreased by 19% whereas petroleum production increased slightly compared with production levels in 2006 (table 1). The country was not well endowed with hydrocarbons and imported much of its total domestic requirements for gas and refined oil. Italy's natural gas reserves were estimated to be 16 billion cubic meters, and its petroleum reserves were estimated to be 100 Mt (table 1; BP p.l.c., 2007).

Major issues in the oil and gas sector included plans to put the Tempa Rossa oilfield in the southern Apennines into production by 2010; petroleum would be extracted from six wells, of which five had been drilled by 2006. At full capacity, output at Tempa Rossa was expected to amount to about 50,000 barrels per day of petroleum, which would be transported to the Toranto refinery by pipeline. Total S.A. of France held 50% of Tempe Rossa's shares, and Exxon Mobil Corp. of the United STates and Royal Dutch Shell plc of the Netherlands each held 25% (Petroleum Economist, 2006b). In midyear 2006, Eni obtained Government approval to develop the Guendalina and the Tea gasfields in the northern Adriatic area. Eni and Mediterranean Oil & Gas Plc of the United Kingdom owned 80% and 20% interest in the project, respectively (Petroleum Economist, 2006a).

Nuclear Energy.—In 2007, Metex Resources Ltd. of Australia remained interested in exploring for uranium in the Region of Lombardy; the company had announced its intention to explore for uranium there in September 2006. Deposits that were estimated to hold inferred resources of 870,000 t of ore (0.15% U_3O_8) had been discovered in the Region in the 1960s. The company submitted an application for an exploration license to the Lombardy government in 2006; in response to pressure from local groups, the government placed a moratorium on processing the application. The area covered by Metex's exploration license application was about 291 hectares (719 acres) near Valgolio (Metex Resources Ltd., 2006).

Outlook

Italy is expected to continue to be a major consumer and producer of durable goods and to continue to rely on imported and recycled mineral raw materials. Cement and steel production will probably continue to decline slowly and eventually to stabilize, as the construction sector that drove it will probably slow down in response to economic conditions following the rapid development of previous years. The country is likely to continue to rely on major imports of mineral fuels, despite some anticipated increases in domestic production from new deposits coming onstream in the near term.

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TABLE 1
ITALY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
METALS						
Aluminum:						
Alumina, calcined basis		1,021,000	1,064,000	1,109,457	1,090,000	1,100,000
Bauxite[e]		--	--	300	--	--
Metal:						
Primary		191,400	195,400	192,900	194,200	182,600 [2]
Secondary		594,000	619,000	654,100	665,500	665,500 [2]
Total		785,400	814,400	847,000	859,700	848,100 [2]
Bismuth, metal[e]		5	5	5	5	5
Cadmium, metal, smelter		22	--	--	--	--
Copper, metal, refined, all kinds[e]		26,700 [2]	33,600	32,200	36,400 [2]	28,600
Gold, mine output, Au content	kilograms	100 [e]	--	--	--	--
Iron and steel, metal:						
Pig iron	thousand metric tons	10,604	10,664	11,423	11,535	11,100
Ferroalloys, electric furnace:[e]						
Ferromanganese		40,000	40,000	40,000	40,000	40,000
Ferrosilicon		12,000	12,000	12,000	10,000	10,000
Silicomanganese		100,000	100,000	100,000	100,000	100,000
Other		10,000	10,000	10,000	10,000	10,000
Total		162,000	162,000	162,000	160,000	160,000
Steel, crude	thousand metric tons	26,832	28,317	29,061	31,624 [r]	31,990 [2]
Lead:						
Mine output, Pb content[e]		2,621 [2]	800	800	800	800
Metal, refined:						
Primary		16,000 [e]	40,000	49,500	34,600	47,800 [2]
Secondary		198,000 [e]	162,000	161,500	155,900	164,000 [2]
Total		214,000	202,000	211,000	190,500	211,800 [2]
Manganese, mine output, Mn content		763	714	600 [e]	600 [e]	600
Silver, mine output, Ag content[e]	kilograms	1,000	200	100	100	100
Zinc, metal, primary		123,100	118,000 [e]	121,200	109,200	100,000
INDUSTRIAL MINERALS						
Barite		12,214	9,698	4,722	5,000 [e]	5,000
Bromine[e]		300	300	300	300	300
Cement, hydraulic	thousand metric tons	43,580	45,343	40,284	43,234	47,541 [2]
Clays, crude:						
Common clay	do.	3,808	3,858	3,651	3,937	3,900
Bentonite	do.	474	475	446	470	470
Refractory, excluding kaolinitic earth	do.	2,639	1,375	1,310	1,964	1,960
Ball clay	do.	691	568	539	550	550
Fuller's earth[e]	do.	3 [2]	3	3	3	3
Kaolin	do.	257	247	250 [e]	470	470
Diatomite[e]		25,000	25,000	25,000	25,000	25,000
Feldspar	thousand metric tons	2,972	3,251	3,335	4,019	4,727 [2]
Fluorspar		26,387	17,915	15,000	15,000 [e]	--
Gypsum	thousand metric tons	1,784	1,616	2,356	2,860	5,458 [2]
Lime, hydrated, hydraulic, and quicklime	do.	5,510	5,982	5,894	5,800 [e]	6,000
Magnesia	do.	444	350	371	348	765
Nitrogen, N content of ammonia	do.	475	532	525	500 [e]	460
Perlite[e]		60,000	60,000	60,000	60,000	60,000
Pigments, mineral, iron oxides, natural[e]		500	500	500	500	500
Pumice and related materials:						
Pumice	thousand metric tons	25	27	28	30 [e]	30
Pozzolan[e]	do.	4,000	4,000	4,000	4,000	4,000
Salt	do.	2,128	3,174	3,613	3,438	2,214 [2]
Sand and gravel	do.	212,169	176,252	206,149	210,000 [e]	210,000

See footnotes at end of table.

TABLE 1—Continued
ITALY: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
INDUSTRIAL MINERALS—Continued						
Silica sand	thousand metric tons	12,656	12,791	13,492	14,000 [e]	14,000
Sodium compounds, n.e.s.:[3]						
Soda ash	do.	193 [r]	505 [r]	525 [r]	500 [r, e]	500
Sodium sulfate[e]	do.	125	125	125	125	125
Stone:						
Calcareous:						
Alabaster[e]	do.	5,000	7,215 [2]	7,000	7,000	7,000
Chalk	do.	474	330	312	228	228
Dolomite	do.	2,046	2,213	2,092	2,192	1,726
Marble and travertine, crude	do.	4,396	5,155	5,061	4,687	4,643
Limestone for lime and cement	do.	28,633	40,000	42,390	41,255	32,953
Granite	do.	2,288	2,637	2,651	1,894	1,477
Sandstone	do.	353	369	362	397	397
Slate	do.	150	143	138	220	288
Crushed and broken[4]	do.	44,562	54,195	61,640	60,000 [e]	60,000 [2]
Sulfur:						
From metallurgy	do.	127	113	92	90 [e]	90 [2]
From hydrocarbons	do.	565	575	650	650 [e]	650 [2]
Talc and related materials		122,849	111,887	112,781	146,942	112,080
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bituminous rock, natural	thousand metric tons	955	1,807	1,900	1,807	1,810
Coal, lignite	do.	10	--	--	--	--
Coke, metallurgical[e]	do.	4,500	4,500	4,000	4,000	4,000
Gas, natural	million cubic meters	13,885	12,961	11,977	11,000	8,900
Natural gas liquids[e]	thousand 42-gallon barrels	350	350	350	350	350 [2]
Petroleum:						
Crude:						
As reported		5,570,000	5,445,000	6,100,000	5,800,000	5,900,000
Converted	thousand 42-gallon barrels	28,407	27,670	31,110	29,600 [e]	30,012
Refinery products[e]	do.	650,000	650,000	650,000	650,000	650,000

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through March 31, 2009.

[2] Reported figure.

[3] Not elsewhere specified.

[4] Output of limestone and serpentine for dimension stone is included with "Stone: Crushed and broken."

TABLE 2
ITALY: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	Eurallumina S.p.A. (UC Rusal, 56.2%)	Plant at Portoscuso, Sardinia	1,000
Aluminum	Alcoa Italia S.p.A. (Alcoa Inc., 100%)	Smelters at Porto Vesme, Sardinia, and Fusina, near Venice	188
Asbestos	Amiantifera di Balangero S.p.A.	Mine at Balangero, near Turin	100
Barite	Bariosarda S.p.A. (Ente Mineraria Sarda)	Barega and Mont 'Ega Mines on Sardinia	100
Do.	Edem S.p.A. (Government)	Mines at Val di Castello, Lucca	20
Do.	Edemsarda S.p.A. (Soc. Imprese Industriali)	Mines at Su Benatzu, Sto. Stefano, and Peppixeddu, Sardina	20
Do.	Societá Mineraria Baritina S.p.A	Mines at Marigolek, Monte Elto, and Primaluna, near Milan	20
Bauxite	Sardabauxiti S.p.A. (Cogein S.p.A., 40%; Comtec S.p.A., 40%; Icofin Co., 20%)	Mine at Olmedo, Sardinia	350
Bentonite	Industria Chimica Carlo Laviosa S.p.A	Mines and plant on Sardinia and a plant near Pisa	250
Cement	52 companies, of which the largest are:		
Do.	Italcementi Fabbriche Riunite Cemento S.p.A.	18 plants, of which the largest are Calusco, Monselice, and Collefero	15,000
Do.	Buzzi Unicem Group	11 plants, of which the largest are Guidonia, Lugagnano, Morano, Piacenza, S'Arcangelo di Romagna, and Settimello	9,000
Do.	Cementerie del Tirreno S.p.A.	6 plants at Arquasta Scivia, Livorno, Maddaloni, Napoli, Spoleto, and Taranto	5,300
Copper:			
Refined	Società Metalli Italia S.p.A.	Refinery at Porto Marghera	60
Refined, secondary	Europametalli - LMI S.p.A.	Refinery at Fornaci di Barga	24
Do.	Sitindustrie S.p.A.	Refinery at Pieve Vergonte	22
Feldspar	At least 5 companies, of which the largest are:	Locations:	1,500
Do.	Maffei S.p.A.	Surface mines at Pinzolo and Campiglia	(200)
Do.	do.	Underground mine at Vipiteno	(300)
Do.	Miniera di Fragne S.p.A.	Surface mine at Alagna Valsesia	(60)
Do.	Sabbie Silicee Fossanova S.P.A.	Surface mine at Fossanova	(30)
Gold kilograms	Sargold Resources plc.	Furtei Mine near Cagliaria, Sardinia	1,400
Gypsum	Fassa S.r.l.	Plant at Moncalvo, Asti	90
Lead, metal	Glencore International AG	Refinery at San Gavino, Sardinia	100
Do.	do.	Kivcet smelter and Imperial smelter at Porto Vesme, Sardinia	80
Lignite	Ente Nazional per l'Energia Electrica	Surface mine at Santa Barbara (closed)	1,000
Lime	Unicale S.p.A.	Plants in Lombardy region	500
Magnesium, metal	Societa Italiana Magnesio S.p.A.	Plant at Bolzano	8
Marble	A number of companies, of which the largest include:	Locations:	2,000
Do.	Mineraria Marittima Srl	Quarries in the Carrara and Massa areas	(500)
Do.	Industria dei Marmi Vicentini S.p.A.	do.	(300)
Do.	Figaia S.p.A.	do.	(100)
Nitrogen, N content of ammonia	Hydro Agri S.p.A.	Plant at Ferrara	410
Petroleum:			
Crude	Ente Nazional Idrocarburi	Oilfields: offshore Sicily, in the Adriatic Sea, and onshore in Po River Valley	90
Refined thousand 42-gallon barrels per day	do.	About 30 refineries	2,000
Potash, ore	Industria Sali Otassici e Affini per Aziono S.p.A.	Underground mines at Corvillo, Pasquasia, Racalmuto, and San Cataldo, Sicily (closed)	1,300
Do.	Sta. Italiana Sali Alcalini S.p.A. (Italkali)	Underground mines at Casteltermini and Pasquasia, Sicily	700

See footnote at end of table.

TABLE 2—Continued

ITALY: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Pumice	Pumex S.p.A.	Quarries, Lipari Island, north of Sicily	600
Do.	Sta. Siciliana per l'Industria ed il Commercio della Pomice di Lipari S.p.A. (Italpomice S.p.A.)	do.	200
Pyrite	Nuova Solmine S.p.A.	Underground mines at Campiano and Niccioleta	900
Salt, rock	Sta Italiana Sali Alcalini S.p.A. (Italkahi)	Underground mines at Petralia, Racalmuto, and Realmonte, Sicily	4,000
Do.	Solvay S.p.A.	Underground mines at Buriano, Pontteginori, and Querceto, Tuscany	2,000
Steel	Ilva S.p.A. (Riva Group)	5 steel plants, of which the largest is Taranto (1,500)	4,000
Do.	Riva Acciaio S.p.A. (Riva Group)	7 steel plants	7,000
Do.	Acciaierie e Ferriere Vicentine Beltrame S.p.A. (AFV-Beltrame S.p.A.)	Steel plant at Vicenza	1,000
Talc	Luzenac Val Chisone S.p.A.	Mines at Pinerolo, near Turin, and at Orani, Sardinia	120
Do.	Talco Sardegna S.p.A.	Mine at Orani, Sardinia	20
Zinc, metal	Glencore International AG	Plant at Porto Vesme, Sardinia	120
Do.	Pertulosa Sud S.p.A.	Plant at Crotone, Calabria	100

Do., do. Ditto.

THE MINERAL INDUSTRY OF KAZAKHSTAN

By Richard M. Levine, Mark Brininstool, and Glenn J. Wallace

Kazakhstan ranked second only to Russia among the countries of the Commonwealth of Independent States (CIS) in the volume of its mineral production. It is endowed with large resources of a wide range of metallic ores, industrial minerals, and mineral fuels, and its metallurgical sector is a major producer of a large number of metals from domestic and imported raw materials. Its mining sector produced bauxite, chromite, copper, gold, iron, lead, manganese, and zinc ores, and its metallurgical sector produced such metals as beryllium, bismuth, cadmium, copper, ferroalloys, lead, magnesium, rhenium, steel, tantalum, titanium, and zinc. The country produced other nonferrous and precious metals and industrial minerals as byproducts or in smaller-scale operations, such as arsenic, barite, cadmium, molybdenum, phosphate rock, and silver. The country was a large regional producer of mineral fuels, including coal, natural gas, and oil, and was a leading world producer of uranium.

Minerals in the National Economy

In 2007, the volume of production in Kazakhstan's mineral extraction industry increased by 2.6% compared with that of 2006. The volume of output of the energy and fuel extraction sector increased by 3% compared with that of 2006, and the volume of output of the mining sector, which excludes fuel and energy raw materials, decreased by 0.4%. The volume of output of the metallurgical sector increased by 3%; within this sector, the volume of production in the ferrous metallurgical sector increased by 11.5% and the volume of production in the nonferrous metallurgical sector decreased by 1.7%. In 2007, the value of industrial production accounted for 28.3% of the value of the gross domestic product in current prices and that of the mineral extraction industry accounted for about 57% of the value of industrial production in current prices (Agency of Statistics of the Republic of Kazakhstan, The, 2009).

Government Policies and Programs

According to the 2003 Land Code, only native born and naturalized citizens of Kazakhstan and Kazakhstan companies may own land in Kazakhstan, although certain categories of land are excluded from private ownership. Only state-owned entities may permanently use land according to this law. Land may be leased on a short-term or a long-term basis. Short-term land leases last for up to 5 years; for long-term leases, the maximum period is 49 years. Kazakhstan law specifies that no sectors of the economy are fully closed to foreign investors, but there are some limitations on participation, depending on the sector. The 2005 Production Sharing Agreement (PSA) law mandates that, for offshore projects, the state oil company JSC NC KazMunaiGaz must have a minimum 50% ownership stake. In 2004, the Government amended the law regulating oil and gas exploration by assigning to the state the right of first refusal on the purchase of shares in PSAs in the extractive industries. According to the Government, the law applies to all existing and future contracts and supersedes any preemptive rights consortium partners might have negotiated in the original contracts (U.S. Department of State, 2007).

Amendments to the Oil and Gas Law that were passed in 1999 require mining and oil companies to use local goods and services. Subsurface users must comply with local content regulations, which obligate them to purchase goods and services from Kazakhstan entities (provided that the local goods meet minimum project standards) and they must also give preference to the employment of local personnel. In their tenders, prospective subsurface users are required to specify the anticipated local content of their work, goods, and services. Amendments to the Law on Subsurface Use, which were approved in 2004, also require that tender proposals specify the user's commitment to developing regional infrastructure and contributing to the provision of social services (U.S. Department of State, 2007).

The Government of Kazakhstan has a major role in overseeing foreign investment. Government officials at the highest levels have screened major foreign investment proposals, such as the PSAs for Kashagan (Kazakhstan's massive offshore Caspian Sea oilfield) and for the Karachaganak oilfield and gasfield, which appears to have received the President of Kazakhstan's personal stamp of approval (U.S. Department of State, 2007).

Amendments to the law "On Petroleum" (the "Petroleum Law") dated June 28, 1995, and to the law "On the Subsurface and Use of the Subsurface" (the "Subsurface Law") dated January 27, 1996, were approved by the Senate on January 12, 2007. These amendments change Kazakhstan's preemptive purchase right by stipulating that the Government must pay the world market price [that is, a price that does not exceed the world market price] and prohibit the transfer of subsurface-use rights "for two years after the effective date of a Hydrocarbon Contract." This rule does not apply to rights "disposed of during a liquidation, reorganization or the exercise of a security interest" or when the transferee is KazMunaiGaz, which is the country's state oil company.

Legislation was also signed into law on January 12, 2007, that prevents foreign investors from selling stakes in Kazakhstan's assets to third parties for 2 years after purchase. In discussing this legislation, the Energy and Natural Resources Minister said that the law would provide a way for the Government to respond to the $1.9 billion sale of the Karazhanbas oilfield by Canada-based Nations Energy Company Ltd. to China International Trust and Investment Corp. (CITIC). The Minister also stated that the 2005 sale of PetroKazakhstan—another Canada-based company with Kazakh oil assets—to a Chinese firm illustrated the need for the new law, which gives Kazakhstan the right of first refusal to buy assets in any proposed transfer of oil assets between foreign companies.

KazMunaiGaz became a stakeholder in PetroKazakhstan in 2005 and, following the passage of this legislation, KazMunaiGaz executed an agreement with CITIC to purchase 50% of Karazhanbas (Caucaz.com, 2005; Access My Library, 2007; Nurshayeva, 2007b).

On September 27, 2007, Kazakhstan's Senate approved a bill "amending the law on subsurface resources and their use," which gives the Government a greater ability to change contracts. The President of Kazakhstan signed the amendments into law on October 24. Under the new law, in those instances in which actions by holders of subsurface deposits have the potential to "lead to essential changes of the economic interests of Kazakhstan, creating a threat to national security," the Government has the right to demand changes in the terms of the contract. The law also allows the Government to annul contracts "if within a period of up to two months after receiving notification the resource user does not provide its written consent to begin talks on changing the terms of a contract or refuses to hold talks; if within a period of up to four months from receipt of the resource user's consent to talks no agreement has been reached; and if in a period of up to six months from the attainment of agreement on restoring Kazakhstan's economic interests the parties do not sign the contract amendments" (Interfax Russia & CIS Oil and Gas Weekly, 2007c; Reuters, 2007b).

Production

In 2007, output decreased somewhat for most of the major mineral commodities produced in the country, which included copper, lead, and zinc metal. Production increased somewhat for other metals, however, including chromite and titanium sponge, of which the country was one of the world's leading producers. In the mineral fuel sector, Kazakhstan continued to increase production of oil and natural gas, of which it was a large regional producer, and of uranium, of which the country planned to be the world's leading producer by 2009. Data on mineral production are in table 1.

Structure of the Mineral Industry

Eurasian Natural Resources Corporation PLC (ENRC) was a mining and metals group with more than 64,000 employees; it had revenue of more than $4.1 billion in 2007. The ENRC group controlled Aluminium of Kazakhstan, Kazchrome chromite mining and ferroalloys production enterprise, Kazmarganets (formerly Zhairem) manganese mining and beneficiation complex, and the Sokolovsko-Sarbay Mining and Production Union (SSGPO), which was the main supplier of iron ore to Russia's Magnitogorsk Iron and Steel Works. The leading shareholders in ENRC were the Kazakhstan Government followed by the copper company Kazakhmys PLC (Kazakhstan Embassy in Ukraine and Moldova, 2007; Kazakhstan News Bulletin, 2007).

In 2007, ENRC announced that it had completed the acquisition of a controlling interest in the Serov group and certain related entities in Russia. The Serov group owned Russia's only chromite producing enterprise as well as a ferroalloy producing enterprise in eastern Russia (Eurasian Natural Resources Corporation PLC, 2008a).

Kazakhmys, which was the country's leading copper producer, was a United Kingdom-registered copper mining company whose main assets were located in Kazakhstan. Its headquarters were located in London and the headquarters of its main subsidiary, Kazakhmys Corp., were located in Dzhezkazgan, Kazakhstan. The company was listed on the London Stock Exchange in October 2005. Glencore International AG, which was headquartered in Switzerland, owned or controlled (by way of subsidiaries) 99% of the shares in Kazzinc JSC, which was the country's leading integrated lead and zinc producer. Kazzinc also produced copper, gold, silver, and other byproduct metals (Kazakhmys PLC, 2007).

All Kazakhstan's major oilfield and gasfield developments since the country achieved statehood in 1991 were by projects in which foreign companies and Kazakhstan state-owned firms had some form of joint ownership. The country's uranium industry was controlled by National Atomic Company Kazatomprom, a holding company that was engaged in six main areas of activity: energy, geologic exploration, metallurgy, scientific support and staff training, social support, and uranium mining. Kazatomprom's stock was 100% held by the Government and it employed more than 25,000 people. Kazatomprom was the country's sole importer, exporter, and transporter of uranium and other products used in the nuclear power industry (Interfax Russia & CIS Metals and Mining Weekly, 2007d).

Mineral Trade

Hydrocarbons (65%) and ores and metals (14%) accounted for 79% of the value of the Kazakhstan's exports (Federation of International Trade Associations, 2008). The country was sending 100% of its gas exports and 90% of its oil exports on routes through Russia. Discussions were underway concerning Kazakhstan diversifying its fuel export routes. Metals were the second ranked export after crude oil (Embassy of Kazakhstan in the United Kingdom of Great Britain and Northern Ireland, The, 2008). The vast majority of Kazakhstan's metal output was exported. China was playing an increasing role as a recipient of Kazakhstan's metal exports. Kazakhmys exported 85% of its cathodes and rods to China (United World, 2007). Kazakhstan had concluded an agreement with China that resulted in the value of Kazakhstan's iron ore exports to China increasing by 83% in 2006 compared with the value in 2005 (Materials World, 2007).

Commodity Review

Metals

Aluminum.—ENRC's alumina and aluminum division included two bauxite mining units, a limestone mine, an alumina refinery, and a powerplant. In December, ENRC announced the startup of the first phase of its aluminum smelter, which had an annual capacity of 62,500 metric tons (t). Construction of the smelter reportedly had proceeded ahead of schedule and was within budget. The smelter's annual capacity was scheduled to be increased to 125,000 metric tons per year (t/yr) in 2008 and would reach the planned full annual capacity of 250,000 t/yr by 2011. The aluminum smelter was to be a key aspect of ENRC's capital expenditure in 2008 (Eurasian Natural Resources Corporation PLC, 2008a).

The Krasnooktyabrskoye bauxite mining directorate (KGBR) and the Torgayskiy bauxite mining directorate were the country's leading bauxite producers and the main suppliers of bauxite for the Pavlodar alumina plant. All bauxite mined in Kazakhstan was processed into alumina at the Pavlodar plant, which was one of the world's 10 largest alumina plants in terms of output.

Kazakhstan adopted a program to increase alumina output from about 1.5 million metric tons (Mt) in 2006 to between 1.6 million metric tons per year (Mt/yr) and 1.8 Mt/yr in the 2007-10 period. High-quality bauxite reserves, which were estimated to be between 35 and 45 Mt, could be sufficient to maintain these production goals for only the next 6 to 10 years. Further development of alumina production would be based on reserves of lower quality bauxite and nonbauxite aluminum raw materials or on imports. In 2007, bauxite was the only aluminum raw material being mined in the country. In previous years, the country had mined nepheline syenite. Total bauxite reserves were reportedly 356.7 Mt in the C1 category, according to the reserves classification system used in the Soviet Union and then Kazakhstan, with another 82.3 Mt of C2 reserves and 13.3 Mt of subeconomic (zabalansovye) reserves. [A more-detailed description of the Soviet reserve classification system is available in the U.S. Bureau of Mines Minerals Yearbook 1989, v. 3, Europe and the USSR.] The country's bauxite reserves are concentrated in the north of the country (Kovzalenko, 2007).

Beryllium.—Kazatomprom, which controlled the country's entire uranium industry, was engaged in full-cycle beryllium production that extended from ore processing to production of beryllium alloys at its Ulba Metallurgical Plant in Oskemen. Ulba was the only plant in the CIS with this production capability. Ulba was also the only enterprise in the CIS with the capability to process tantalum feedstock and produce finished products (Interfax Russia & CIS Metals and Mining Weekly, 2007e).

Kazatomprom's strategy for development of beryllium production included (1) improving existing technology for extracting beryllium from ores and concentrates to obtain cheaper beryllium hydroxide with a quality equal to the hydroxide that it was using; (2) developing technologies and equipment for producing different types of products from beryllium bronze in accordance with world and domestic market requirements, including products for the oil and gas industry of Kazakhstan; and (3) improving technologies and equipment for producing beryllium metal and beryllium-bearing master alloys to reduce production costs. To implement this strategy, Kazatomprom was engaged in a number of projects, which included a project for the production of beryllium bronze rolled metal in China with Ningbo Xinye Electric Copper Strip Co., which was part of Shine Copper Industry Co. Ltd. In November 2007, the joint venture was registered under the name Yingtan Ulba Shine Metal Materials Company Ltd. (National Atomic Company Kazatomprom, 2009a).

Chromium.—ENRC's ferroalloy division produced and sold ferrochromium and other ferroalloys primarily to steel producers, and sold chromite and manganese ore to ferroalloy producers and the chemical industry. The ferroalloy division was a vertically integrated operation that included chromite and manganese ore mines and two ferroalloy plants. The division's chromite reserves, which were reported to be 166 Mt as of December 31, 1997, were believed to be the largest in the CIS and to be among the world's highest grade reserves (42.2% Cr_2O_3) for large-scale producers (Eurasian Natural Resources Corporation PLC, 2008a).

ENRC'S chromite mining enterprise, Kazchrome, was the world's leading chromium ore mining enterprise, the world's leading ferrochrome producer on the basis of chromium content, and the world's third ranked ferrochromium producing enterprise. Kazchrome was one of the main assets of ENRC (Kazakhstan Embassy in Ukraine and Moldova, 2007; Kazakhstan News Bulletin, 2007). Kazchrome supplied high-quality ferroalloys to leading steelmakers worldwide, including countries in Southeast Asia, Europe, North America, and South America. Kazchrome had invested in new technology and plant facilities, which had increased its annual ferrochrome production to more than 1 Mt/yr, and it planned to increase production of calcined chrome ore pellets substantially by adopting new technology.

Kazchrome consisted of the following four production units: the Aqtobe and Aksu ferroalloys plants, the Donskoy mining and beneficiation complex, and the Kazmarganets manganese mining and beneficiation complex. It employed about 18,000 workers and had 43 electric arc furnaces engaged in ferroalloy production. The company's Molodezhnaya Mine produced about 2 Mt/yr of chromite. The chromite mining division had three beneficiation plants with the capacity to process 5 Mt/yr of ore. A newly constructed fired pellets plant that employed technology from the Finnish company Outokumpu Technology Oy Finland was to have an annual capacity of 700,000 t (Eurasian Natural Resources Corporation PLC, 2008a).

ENRC's acquisition of the Serov chromite mining and ferroalloys properties in Russia helped fulfill a number of important aspects of the company's strategy. The transaction was ENRC's first acquisition outside of Kazakhstan and strengthened its position as a producer of low-carbon and medium-carbon ferrochrome. The acquisition provided ENRC with an incremental annual sales volume of about 200,000 t and also enabled ENRC to benefit from further vertical integration within its ferroalloys business. It also provided ENRC with an important asset base in Russia, which supported its strategy of pursuing regional expansion opportunities (Eurasian Natural Resources Corporation PLC, 2008a).

The ferroalloy division's principal strategic objective was to increase production of ferrochrome. To fulfill this objective, the ferroalloy division planned to construct new furnaces at the Aksu ferroalloys plant, which was expected to increase the ferroalloy division's annual ferrochrome production by more than 200,000 t by 2011 (Eurasian Natural Resources Corporation PLC, 2008a).

Copper.—The country's leading copper producer, Kazakhmys, was engaged in mining, beneficiating, smelting, and refining copper products, including copper cathodes and rods. Kazakhmys' copper division consisted of 20 mining entities with 14 underground mines and 6 open pit mines. The mineral reserves and resources of these mines reportedly were adequate to support projected production for at least 20 years. Ore was processed in 10 concentrators and 2 smelters and refineries. Kazakhmys' copper division was divided into four administrative areas—the Balkhash complex, the East region, the Karaganda region, and the Zhezkazgan complex. In addition to producing copper, the division produced significant quantities of gold, silver, and zinc. The division had spare smelting capacity, and copper concentrate was purchased, which provided additional output (Kazakhmys PLC, 2007). Kazakhmys also owned Mansfeld, Kupter und Messing GmbH (MKM), a copper products fabrication company located in Germany. Kazzinc, which was the country's major lead and zinc producer, also produced significant amounts of copper; in 2007, it produced 66,389 t of refined copper (Metall Ukrainy, 2008).

Iron Ore.—In 2007, SSPGO, which was ENRC's iron ore division, mined iron ore, which was processed into concentrate and fluxed pellets for domestic customers and foreign customers primarily in China and Russia. The iron content of its iron ore concentrate reached 66%, and the iron ore content of its fluxed pellets, about 61.5%. SSGPO's assets included the Kachar, the Kurzhunkul, the Sarbai, and the Sokolov iron ore open pits; the Sokolov underground mine; dolomite and limestone open pits; and concentrating, pelletizing, and stone-crushing facilities. Power for these operations was supplied by the Rudny heat and energy plant, which was purchased by SSGPO in 1998. SSPGO employed about 18,500 people. The company's investment program was directed at increasing production levels and efficiency through the installation of integrated computer systems. Through enhanced computer systems, capacity at the Sokolov open pit, for example, had risen substantially within the past 2 years. SSPGO reportedly had iron ore resources totaling 3.6 billion metric tons (Gt), of which 1.5 Gt was reportedly proved and probable reserves capable of sustaining production for 40 years (Eurasian Natural Resources Corporation PLC, 2008c).

The principal strategic objectives of SSGPO were to increase capacity at its mining, beneficiating, and pellitizing facilities. SSPGO planned to expand mining operations and increase iron ore concentrate production capacity by approximately 4 Mt/yr by 2010 and to construct a 1.8-Mt/yr direct-reduced iron (DRI) plant and a 5-Mt/yr iron ore pelletizing unit. DRI, which is a higher value product, had a broader customer base than ENRC's existing iron ore products because it is relatively cheaper to transport DRI than concentrate or pellets for long distances and DRI can be used in electric furnaces, which is not the case with concentrate and pellets. Construction of the DRI plant was scheduled to start in 2008; the plant was expected to be completed by 2011 (Eurasian Natural Resources Corporation PLC, 2008a).

Lead and Zinc.—Kazzinc was the country's leading producer of lead and zinc. In 2007, Kazzinc increased its lead metal production by 5.6% to 90,689 t compared with production in 2006 and refined zinc production by 1.8% to 294,384 t. Kazakhmys also produced significant quantities of zinc.

Kazzinc was completing the acquisition of JSC Kaz-Tyumen in Ridder in northeastern Kazakhstan, which processed lead battery scrap into lead bullion and refined metal. The assets of Kaz-Tyumen would be combined with Kazzinc's Ridder Zinc Refinery to form the Ridder Metallurgical Complex, which would be a subdivision of Kazzinc. Kazzinc was developing a modernization program for its lead plant, which would be based on treating a feed made up of lead scrap together with flue dusts and lead cakes generated by Kazzinc's metallurgical operations. Also, measures would be undertaken to improve the environmental performance of the plant and lessen its impact on the town of Ridder. The acquisition and modernization of Kaz-Tyumen would provide Kazzinc with the opportunity to increase its treatment of secondary-lead-bearing feeds and, in addition, would release primary smelting capacity at Kazzinc's Ust-Kamenogorsk lead smelter (Kazzinc JSC, 2008).

ShalkiyaZinc N.V. was another zinc and lead mining company in Kazakhstan. The company's main operations were located in southern Kazakhstan and included the underground Shalkiya Mine that mined the Shalkiya deposit in the Kyzylorda Region, a processing plant near the town of Kentau [which is located 165 kilometers (km) southeast of the Shalkiya Mine], and the Talap greenfield deposit, which is located 30 km southwest of the Shalkiya Mine. The Shalkiya deposit was one of the company's major assets; the deposit was reportedly the largest known zinc deposit in Kazakhstan and accounted for approximately 30% of the country's total zinc reserves. ShalkiyaZinc sold zinc and lead concentrate to regional smelters and traders. It is listed on the London Stock Exchange (London Stock Exchange plc, 2006; Reuters, 2006). Based on a new audit of its reserves, which was conducted by AMC Consultants of the United Kingdom according to the Australasian Joint Ore Reserves Committee (JORC) system, ShalkiyaZinc planned to increase its lead-zinc ore extraction at the Shalkiya deposit to 4 Mt/yr from 3 Mt/yr by 2010. According to the latest audit, ShalkiyaZinc's probable ore in situ metal reserves were estimated to total 6.6 Mt of zinc and 1.7 Mt of lead. The new audit showed that the zinc content of ore that could be profitably mined was far lower than 3%, which was the previous assessment. ShalkiyaZinc had a contract with Outokumpu to construct a new ore processing plant at the deposit (Interfax Russia & CIS Metals and Mining Weekly, 2007c).

Manganese.—The Kazmarganets manganese mining and processing enterprise was the country's main manganese producer. It was under the control of Kazchrome, which was a part of ENRC. Kazmarganets reportedly had measured and indicated resources totaling 47.7 Mt of manganese ore and proved and probable reserves totaling 24.5 Mt. Kazmarganets comprised the East, the Kamys, and the Tur manganese ore deposits (located in the Karaganda region), and the Zhezdy processing plant. It had the capacity to process more than 1 Mt/yr of ore to produce 330,000 t/yr of manganese concentrate. Kazmarganets' investment program was directed towards the expansion of operating facilities and the discovery of new deposits in the Ulytau-Zhezdy area (Eurasian Natural Resources Corporation PLC, 2008b).

Tantalum.—Kazatomprom, which was the Government-owned uranium company, also controlled the country's tantalum production. Kazatomprom's tantalum production complex was located at the Ulba Metallurgical

Plant in Oskamen and was one of the world's leading tantalum production enterprises. It had a complete production cycle, from the reprocessing of tantalum-niobium-bearing feedstock to the production of finished products. Kazatomprom did not have its own tantalum resources and purchased tantalum concentrate. Kazatomprom formulated a strategic plan to develop its tantalum production sector, which includes construction of a capacitor production plant and production of high-capacity tantalum capacitor powders (National Atomic Company Kazatomprom, 2009b).

Titanium.—The Ust-Kamenogorsk titanium-magnesium complex (UKTMK) was producing at about 50% of its design capacity. It exported about 50% of the titanium sponge it produced to the United States. The complex had developed its own domestic resources of titanium raw material (which it previously had imported primarily from Ukraine) and had also commissioned facilities to produce titanium ingots and slabs. Ilmenite ore was being mined at the Obukhovskoye, the Satpayevskoye, and the Shokoshskoye deposits in Kazakhstan (Skorodumov and Nikitina, 2007).

Mineral Fuels and Related Materials

Coal.—Kazakhstan reportedly contains Central Asia's largest recoverable coal reserves. The country has registered 49 deposits in its state reserve balance; the deposits contain a total of 33.6 billion metric tons (Gt), of which 21.5 Gt are hard coal and 12.1 Gt are brown coal. The reserves occur mainly in the Ekibastuz, the Karaganda, and the Shubarkol deposits and the Turgay coal basin. Coal mining in Kazakhstan was conducted by 33 companies, including 5 foreign companies (Interfax Russia & CIS Metals and Mining Weekly, 2007a, b).

Kazakhstan produced more coal than it consumed and exported coal mostly to Russia followed by Ukraine. Coal accounted for about 80% of electricity generation in Kazakhstan. After acquiring independence, coal production was hampered initally by the country's inability to attract foreign investment to maintain the viability of the industry. By 2007, however, the country's coal industry had received significant foreign investment. In 2007, the ArcelorMittal Group stated that it would invest $500 million to increase coal production by about 5 Mt in the Karaganda region. One of the country's leading coal producers was Bogatyr Coal, LLP, which produced about 70% of the coal output from the Ekibastuz Basin. Bogatyr Coal was developing the Bogatyr and the Severny coalfields in the Ekibsatuz Coal Basin. It was the country's leading coal exporter to Russia, which used the coal primarily in electric powerplants in southern Russia. Russian firms also owned stakes in Kazakhstan's coal industry (Bogatyr Komir, 2007; U.S. Energy Information Administration, 2008b).

In 2007, Kazakhstan produced 93.6 Mt of coal, which was a 2.8% decrease compared with production in 2006. Long-range plans called for Kazakhstan to reduce coal consumption by 45% by 2024 as part of its program to achieve sustainable growth. At the same time, the use of renewable energy was targeted to increase from 0.2% in 2006 to 5% in 2024. Long-range plans also called for Kazakhstan to increase annual coal production to 145.6 Mt by 2020 according to the Coal Industry Department at the Energy and Mineral Resources Ministry. Production of metallurgical coal was projected to increase to 24.3 Mt in 2020 from 12.9 Mt in 2006, and production of steam coal, to 121.3 Mt from 83.4 Mt. Achieving the targeted level for 2020 would require an investment of $3.9 billion, of which $2.1 billion would be targeted for metallurgical coal development and $1.8 billion would be targeted for steam coal (Interfax Russia & CIS Metals and Mining Weekly, 2007b).

Natural Gas.—Although in 2007 Kazakhstan produced about as much natural gas as it consumed, the country was poised to become a net exporter in 2008 based on production at the Karachaganak and the Tengiz fields. More than 70% of the country's natural gas was produced by international consortia at the Karachaganak and the Tengiz fields. In 2007, the Oil & Gas Journal revised upwards its estimate of proven natural gas reserves in Kazakhstan to 100 trillion cubic feet (about 2.8 trillion cubic meters), which was roughly equal to Turkmenistan's natural gas reserves. Most of Kazakhstan's natural gas reserves are located in the west of the country, and about 25% of its proven reserves are located in the Karachaganak field. This oil and gas condensate field reportedly has proven natural gas reserves of 48 trillion cubic feet (1.36 trillion cubic meters). The consortium developing Karachaganak expected to produce 900 billion cubic feet (about 25.5 billion cubic meters) by 2012. Natural gas production in Kazakhstan was almost entirely associated gas. The country had three gas processing plants (U.S. Energy Information Administration, 2008a, c).

Petroleum.—Kazakhstan reportedly has the largest recoverable crude oil reserves in the Caspian Sea region and produced about one-half of the crude oil output in the region (U.S. Energy Information Administration, 2008d). Kazakhstan has most of the largest known oilfields in the Caspian Sea. The country's combined onshore and offshore proven hydrocarbon reserves have been estimated to be between 9 and 40 billion barrels (Gbbl) (1.2 and 5.4 Gt), which is comparable to Algeria on the lower end and Libya on the higher end of the estimates. Major oil-producing enterprises included CNPC-Aktobemunaigas, Hurricane Kumkol Munai, the Karachaganak Petroleum Operating BV, Mangistaumunaigas, the Tengizchevroil joint venture, and Uzenmunaigaz; these enterprises accounted for about 70% of hydrocarbon production in the country. Other production was centered in smaller fields.

Oil production growth was expected to increase in the next decade primarily from the Tengiz field, where production was expected to double, and from the Kashagan offshore field, which could produce an additional 1 million barrels per day (Mbbl/d) after 2011. The Tengiz field, which had been developed since 1993 by the Tengizchevroil joint venture, was the country's leading oil producer; Chevron Corp. estimated recoverable crude oil reserves to be between 6 and 9 Gbbl (800 Mt and 1.2 Gt) (U.S. Energy Information Administration, 2008d).

The Kashagan field, which is located off the northern shore of the Caspian Sea near the city of Atyrau, is the largest oilfield in terms of reserves outside the Middle East and the fifth largest in the world. The field's recoverable reserves were estimated to be 13 Gbbl (1.77 Gt) of oil equivalent, with total reserves-in-place of about 38 Gbbl (5.2 Gt). The field could produce about 300,000 barrels per day (bbl/d) (almost 15 Mt/yr) by late 2011, and full-scale commercial production was expected to commence in 2013. Peak production from Kashagan was estimated to be about 1.3 Mbbl/d (about 65 Mt/yr). The Kashagan field presented particular challenges for its developers because it contains a high proportion of natural gas under very high pressure and contains large quantities of sulfur. Offshore platforms must also withstand extreme weather fluctuations in the northern Caspian Sea. Additional oil production could originate from the Karachaganak oilfield and gas condensate field onshore in northern Kazakhstan near the border with Russia's Orenburg field. Karachaganak's oil reserves were estimated to be between 8 and 9 Gbbl (1.1 and 1.2 Gt) of oil and gas condensate (U.S. Energy Information Administration, 2008d).

In 2007, the shareholders in the Kashagan project [a consortium known as Agip Kazakhstan North Caspian Operating Co. (Agip KCO)] were as follows: Eni S.p.A of Italy, Exxon Mobil Corp. of the United States; Royal Dutch Shell plc (RDSa.L) (headquartered in the Netherlands and registered in the United Kingdom), and Total S.A. (headquartered in France) (18.52% interest each); ConocoPhillips Co. of the United States (9.26%), and Inpex Corp. of Japan and KazMunaiGaz (8.33% each). Eni was the operating company. Oil production was originally planned to begin by the end of 2008 with a target production level of about 300,000 bbl/d (almost 15 Mt/yr). On June 29, Eni rescheduled the production plans with Kazakhstan's authorities to show a new initial production date in 2010 and a new phase 1 cost increase to $19 billion (from an initial estimate of $10.3 billion). The Government of Kazakhstan rejected these plans and negotiations were begun to settle the dispute (Eni S.p.A., 2008, p. 26-27).

On August 27, 2007, Kazakhstan's Environmental Protection Minister suspended operations at Kashagan for 3 months, citing violations of environmental protection laws. Also on this date, Kazakhstan's Emergency Situations Ministry's Fire Service suspended the operation of an Agip KCO refining installation, citing fire safety violations, and the Customs Control Committee of Kazakhstan's Finance Ministry opened a criminal case against several high-ranking executives of the Agip KCO consortium on charges of evading customs duties (Interfax Russia & CIS Oil and Gas Weekly, 2007b).

On September 6, 2007, Kazakhstan's Prime Minister said that, in accordance with the wishes of Kazakhstan's President, KazMunaiGaz should become a cooperator of the Kashagan project (Interfax Russia & CIS Oil and Gas Weekly, 2007a). Agip KCO and the Government of Kazakhstan continued to debate the issue of ownership of Agip KCO throughout the year. On January 14, 2008, the members of the Agip KCO consortium and the Government of Kazakhstan reached an agreement to settle the dispute. Under the terms of the agreement KazMunaiGaz would increase its share in Agip KCO to 16.81% from 8.33%. KazMunaiGaz would purchase the shares from the other shareholders for $1.78 billion on a pro-rata basis. Agip KCO also agreed to pay the Government about $5 billion through a one-off payment and additional royalty payments. Kazakhstan's Energy Minister also stated that Eni would lose its position as the operating company, although a new operating company was not named at that time (Nurshayeva, 2008).

The Tengiz oilfield and gasfield was operated by Tengizchevroil. Tengizchevroil stakes were divided between Chevron (50%), ExxonMobil (25%), KazMunaiGaz (20%), and Lukoil of Russia (5%) (Reuters, 2007a). In 2007, the field's production capacity was approximately 400,000 bbl/d (almost 20 Mt/yr) and production was about 300,000 bbl/d (almost 15 Mt/yr); the capacity was expected to increase to 540,000 bbl/d (almost 27 Mt/yr) in the second half of 2008 (Chevron Corp., 2008, p. 33). According to Chevron, Tengiz could potentially produce 700,000 bbl/d (almost 35 Mt/yr) by 2010 if its sour gas injection program was fully implemented (U.S. Energy Information Administration, 2008d).

In January 2007, the Prosecutor's office in the Atyrau region of Kazakhstan said that it would audit Tengizchevroil to make sure the company had not broken any environmental laws by storing 8.9 Mt of sulfur in a field at Tengiz. The sulfur was a byproduct of oil and gas production at Tengiz (Interfax Russia & CIS Oil and Gas Weekly, 2007d). On February 21, the Kazakhstan Ecology Ministry stated that Tengizchevroil could be fined and even shut down if they did not submit concrete proposals within a month to rectify environmental violations (Interfax Russia & CIS Oil and Gas Weekly, 2007e). On April 4, the Ecology Ministry said that it would drop charges against Tengizchevroil in exchange for the group agreeing to spend up to $300 million per year for environmental protection (Nurshayeva, 2007a). In the beginning of October, the Government fined Tengizchevroil $609 million because it was making slow progress in removing sulfur stocks from open air storage. Chevron said that the company would fight the ruling (Reuters, 2007c). In the middle of November, the fine was reduced to $309 million and paid by Tengizchevroil (AFX News Ltd., 2007).

Uranium.—Kazakhstan reportedly contains about 19% of the world's explored uranium reserves, or about 1.6 Mt. The uranium deposits are grouped into the following six uranium provinces: the Chu-Sarysu uranium ore province, which had the Kanzhugan, the Moinkum, and the Uvanas Mines in operation; the Syrdarya uranium ore province, which had the Northern Karamurun and the Southern Karamurun Mines in operation; the Northern Kazakhstan uranium ore province, which had the Vostok Mine and the Stepnogorsk mill in operation; the Caspian uranium ore province, where uranium production had been mothballed since the collapse of the Soviet Union; the Balkhash uranium ore province, where uranium mining was discontinued after the major deposits were depleted during the Soviet era; and the Ili uranium ore province, where uranium occurs mainly in uranium-coal deposits formed by oxidation of the lignite beds roofs—there was no uranium production in this province in 2007 (National Atomic Company Kazatomprom, 2009c).

In 2007, Kazakhstan produced 6,637 t of uranium (U content), which was almost 26% more than was produced in 2006. Plans called for increasing uranium production by 2009 to about 12,000 t, which would make Kazakhstan the world's leading uranium producer. The commissioning of new mines was proceeding on schedule, and Kazakhstan was aiming to be world's leading uranium producer by 2009. Kazakhstan had established three joint ventures with Russia to mine uranium in Kazakhstan, enrich it in Russia, and design and build nuclear powerplants to be sold to other countries (Interfax Russia & CIS Metals and Mining Weekly, 2007e, 2009).

Outlook

Kazakhstan's long-term mineral development prospects remain promising. Oil production is expected to triple over the next decade, and Kazakhstan is poised to become the world's leading uranium producer. Production growth had been taking place in practically all sectors of the mineral industry and is expected to continue in the next decade.

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TABLE 1

KAZAKHSTAN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
METALS						
Aluminum:						
Alumina	thousand metric tons	1,420 [r]	1,468	1,505	1,515 [r]	1,556
Bauxite		4,737,100	4,705,600	4,815,400 [r]	4,860,000 [r]	4,800,000 [e]
Arsenic trioxide[e]		870 [r]	1,200 [r]	1,000 [r]	1,000 [r]	1,500
Beryllium		NA	NA	NA	NA	NA
Bismuth:[e]						
Mine output, Bi content		75 [r]	90 [r]	150 [r]	160 [r]	145
Metal, refined		130	130	120	115	120
Cadmium, metal		1,351	2,358 [r]	1,624 [r]	2,000 [e]	2,100 [e]
Chromite		2,927,800 [r]	3,287,100 [r]	3,581,242 [r]	3,366,078 [r]	3,687,200
Copper:						
Mine output, Cu content		485,400 [r]	461,200 [r]	401,700 [r]	434,100 [r]	405,000 [e]
Metal:						
Smelter, undifferentiated		431,930	445,200	404,817 [r]	426,000 [e]	409,000 [e]
Refined, primary		432,511 [r]	445,268 [r]	418,356 [r]	427,723 [r]	406,091
Gallium[e]		10	5	7	10	10
Gold:						
Mine output, Au content	kilograms	19,266 [r]	19,261 [r]	18,062	21,805 [r]	22,000 [e]
Metal, refined	do.	9,906	9,576	9,788	9,000 [r, e]	8,123
Iron and steel:						
Iron ore, marketable:						
Gross weight		19,280,900 [r]	20,402,500 [r]	19,471,100 [r]	22,262,600 [r]	23,834,100
Fe content		10,100,000 [r]	11,600,000 [r]	11,100,000 [r]	12,700,000 [r]	13,600,000 [e]
Metal:						
Pig iron		4,140,000 [e]	4,283,142 [r]	3,581,090	3,400,000	3,240,000
Ferroalloys:						
Ferrochromium		993,000	1,080,993	1,156,168	1,200,000 [e]	1,200,000 [e]
Ferrochromiumsilicon		98,130	104,800	97,870	100,000 [e]	105,000 [e]
Ferromanganese[e]		1,931 [3]	2,000	2,100	2,100	2,100
Ferrosilicon		127,300	103,580	104,185	105,000 [e]	105,000 [e]
Silicomanganese		178,920	155,324	170,214	220,000 [e]	220,000 [e]
Other[e]		9,000	9,000	9,000	9,000	9,000
Total		1,408,281	1,455,697	1,539,537	1,640,000 [e]	1,640,000 [e]
Steel:						
Crude		5,069,401 [r]	5,371,698 [r]	4,476,642 [r]	4,244,521 [r]	4,784,105
Finished, rolled		3,837,800	4,039,700	3,392,000	3,163,000	3,437,000

See footnotes at end of table.

TABLE 1—Continued
KAZAKHSTAN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
METALS—Continued						
Lead:						
Concentrate, Pb content		37,500 r	33,000 r	31,000 r	48,100 r	40,200
Refined, primary and secondary		133,178 r	157,016 r	135,446 r	115,974 r	117,641
Magnesium, metal, primary e		14,000	18,000	20,000	21,000	21,000
Manganese ore, crude ore:						
Gross weight		2,361,000	2,318,000	2,207,700	2,531,100 r	2,482,000
Mn content e		580,000	570,000	540,000	550,000	600,000
Molybdenum, concentrate, Mo content		230	230 e	230	250	400
Nickel, Ni content of laterite ore		--	--	193	200 e	200 e
Rhenium e	kilograms	2,600	5,000	8,000	8,000	7,700
Silicon		83,000	88,000	95,000	95,000	95,000
Silver, mine output, Ag content	kilograms	826,500 r	733,000 r	832,000	830,000	800,000 e
Tantalum		NA	NA	NA	NA	NA
Tin, mine output, Sn content		13	14	5	NA	NA
Titanium:						
Ilmenite and leucoxene		9,300	11,670	10,000	25,000	25,000
Sponge		12,500	16,500	19,000	23,000	25,400
Vanadium, ores, concentrates, slag, Va content e		1,000	1,000	1,000	1,000	1,000
Zinc:						
Mine output, Zn content		393,500 r	361,400 r	364,300 r	404,600 r	386,000
Smelter, primary and secondary		316,731 r	357,090 r	364,821 r	364,821 r	358,226
INDUSTRIAL MINERALS						
Asbestos, all grades		354,500	346,500	300,500 r	300,000 r, e	300,000 e
Barite		79,000 r	115,000 r	95,000 r	95,000 r, e	95,000 e
Boron e	thousand metric tons	30	30	30	30	30
Cement		2,569,700	3,662,000	3,974,800	4,880,200 r	5,698,600
Clays, kaolin e		-- r	-- r	-- r	-- r	--
Fluorspar		3,500 r	4,000 r	4,750 r	4,750 r, e	4,750 e
Gypsum		711,000 e	800,000	820,000	820,000	820,000
Phosphate rock:						
Gross weight		378,090 r	511,950 r	460,230 r	450,000 e	300,000
P_2O_5 content e		85,000 r	116,000 r	96,200 r	92,500 r	60,000
Salt and sodium chloride		287,238	347,850	178,167	416,680	227,643
Sulfur, byproduct:						
Metallurgy		327,000 r	351,000 r	235,000 r	235,000 r, e	300,000 e
Natural gas and petroleum		1,585,000 r	1,625,000 r	1,590,000 r	1,650,000 r	2,300,000 e
Total		1,912,000 r	1,976,000 r	1,825,000 r	1,885,000 r	2,600,000 e
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	thousand metric tons	80,807	83,065	82,788	91,547	88,974
Lignite	do.	4,099	3,810	3,798	4,773	4,638
Total	do.	84,906	86,875	86,586	96,320	93,612
Natural gas	thousand cubic meters	14,700,000	14,400,000	14,494,000	14,440,000	15,699,000
Petroleum:						
Crude oil and gas condensate:						
In gravimetric units		51,451,000	59,485,000	61,500,000	64,860,000	67,640,000
In volumetric units e	42-gallon barrels	378,000,000	437,000,000	451,000,000	476,000,000	496,000,000
Refinery products		8,750,000 e	9,390,000	11,170,000	11,664,000	12,000,000 e
Uranium:						
U content		3,300 r	3,719 r	4,357 r	5,279 r	6,637
U_3O_8 content		3,892 r	4,386 r	5,138 r	6,226 r	7,827

e Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. r Revised. do. Ditto. NA Not available. -- Zero.

[1] Table includes data available through February 28, 2009.

TABLE 2

KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Alumina	Pavlodar aluminum plant [Eurasian Natural Resources Corporation PLC (ENRC)]	Pavlodar	1,250,000
Aluminum, primary	Kazakhstan aluminum smelter [Eurasian Natural Resources Corporation PLC (ENRC)]	do.	62,500
Arsenic trioxide	Chimkent polymetallic enterprise and other nonferrous metallurgical enterprises	Shymkent	3,500
Asbestos	Facilities:	Locations:	1,000,000 [3]
	Dzhetygara complex	Qostanay	
	Chilisay complex	Aqtobe phosphorite basin	
Barite	Facilities:	Locations:	300,000 [3]
	Karagaylinskiy and Zhayrem mining and beneficiation complexes	Karagayly, Zhayrem deposit	
	Tujuk Mine	Almaty	
	Achisay polymetallic complex	Kentau region	
Bauxite	Turgay and Krasnooktyabrsky bauxite mining complexes [Eurasian Natural Resources Corporation PLC (ENRC)]	Central Kazakhstan	5,000,000
Beryllium, metal	Ulba metallurgical plant (National Atomic Company Kazatomprom)	Oskamen	NA
Bismuth, metal	Facilities:	Locations:	70 [3]
	Ust-Kamenogorsk lead-zinc metallurgical plant (Kazzinc JSC)	Oskamen	
	Ridder lead smelter (Kazzinc JSC)	Ridder	
Do.	Chimkent refinery	Shymkent	20
Cadmium	do.	do.	10
Do.	Ridder mining-beneficiation complex (Kazzinc JSC)	East Kazakhstan region	1,200
Chromite, mine output, Cr_2O_3 content (50%)	Donskoy GOK mining-beneficiation complex [Kazchrome, a subsidiary of Eurasian Natural Resources Corporation PLC (ENRC)]	Khromtau, Kempirsai region	5,000,000
Coal	Ekibastuz Basin, among which:	Central and north-central parts of the country	95,000,000 [3]
	Bogartyr Mine	Northern Kazakhstan	
	Severny Mine	do.	
Do.	Karaganda Basin	do.	50,000,000
Do.	Maykuben Basin	Central and north-central parts of the country	10,000,000
Do.	Shubarkul Basin	do.	6,500,000
Do.	Turgay Basin	do.	1,000,000
Copper:			
Mining, recoverable, Cu content	Kazakhmys PLC mines:	Locations:	
	Balkhash complex:		
	Kounrad Mine	South-central Kazakhstan	11,800
Do.	Sayak Mine	do.	23,500
Do.	Shatyrkul Mine	do.	12,700
	East Region:		
Do.	Artemyevskoe Mine	East Kazakhstan	7,820
Do.	Belousovskoe Mine	do.	2,700
Do.	Irtyshskoe Mine	do.	5,750
Do.	Nikolaevskoe Mine	do.	25,700
Do.	Orlovskoe Mine	do.	86,200
Do.	Yubileyno-Snegirikhinskoe Mine	do.	14,200
	Karaganda Region:		
Do.	Abyz Mine	North-central Kazakhstan	5,710
Do.	Nurkazgan Mine	do.	1,190

See footnotes at end of table.

TABLE 2—Continued
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Copper—Continued:			
Mining, recoverable, Cu content—Continued	Kazakhmys PLC mines—Continued:	Location:	
	Zhezkazgan complex:		
	Annensky Mine	North-central Kazakhstan	6,630
Do.	East Mine	do.	65,800
Do.	North Mine	do.	32,500
Do.	South Mine	do.	71,600
Do.	Stepnoy Mine	do.	31,700
Do.	West Mine	do.	23,300
	Kazzinc JSC (Glencore International AG, 99%):	Location:	
	Ridder:		
Do.	Ridder-Sokolny Mine	East Kazakhstan	NA
Do.	Shubinsky Mine	do.	2,750
Do.	Tishinsky Mine	do.	15,000
Do.	Zyrianovsk: Maleevsky Mine	do.	62,100
Processing, recoverable, Cu content	Kazakhmys PLC mines or plants:	Locations:	
	Balkhash complex: Balkhash concentrator	South-central Kazakhstan	39,500
	East Region:		
Do.	Belousovskoe Mine	East Kazakhstan	2,100
Do.	Irtyshskoe Mine	do.	3,890
Do.	Nikolaevskoe Mine	do.	21,200
Do.	Orlovskoe Mine	do.	77,800
Do.	Karaganda Region: Abyz Mine	North-central Kazakhstan	4,000
	Zhezkazgan complex:		
Do.	Stepnoy Mine	do.	58,200
Do.	Zhezkazgan concentrator:		
	Number 1	do.	88,800
Do.	Number 2	do.	111,000
	Kazzinc JSC:	Location:	
Do.	Ridder: Ridder concentrator	East Kazakhstan	NA
Do.	Zyrianovsk: Zyrianovsk concentrator	do.	1,200
Metal	Kazakhmys PLC mines or plants:	Locations:	
	Balkhash complex:		
Do.	Balkhash smelter	South-central Kazakhstan	250,000
Do.	Balkhash refinery	do.	250,000
	Zhezkazgan complex:		
Do.	Zhezkazgan smelter	North-central Kazakhstan	215,000
Do.	Zhezkazgan refinery	do.	250,000
Do.	Kazzinc JSC: Ust-Kamenogorsk: Lead smelter	Oskamen	80,000
Ferroalloys:			
Ferrochrome:			
High-carbon 60%	Aqtobe (Aktyubinsk) plant [Kazchrome, a subsidiary of Eurasian Natural Resources Corporation PLC (ENRC)]	Aqtobe	200,000
Medium-carbon 60%	do.	do.	200,000
Do.	Aksu plant [Kazchrome, a subsidiary of Eurasian Natural Resources Corporation PLC (ENRC)]	Aksu	200,000
Ferrosilicon	do.	do.	700,000
Ferrosilicochrome	do.	do.	700,000
Ferrochrome, high-carbon	do.	do.	500,000
Silicomanganese	do.	do.	90,000
Gallium	Pavlodar aluminum plant [Eurasian Natural Resources Corporation PLC (ENRC)]	Pavlodar	NA
Gold	Byproduct of polymetallic ores and native gold mining	NA	30

See footnotes at end of table.

TABLE 2—Continued

KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Iron and steel:			
Pig iron	Ispat-Karmet Steelworks	Karaganda	5,000,000
Steel, crude	do.	do.	6,300,000
Iron ore, marketable	Lisakovskiy and Sokolovsko-Sarbai mining and metallurgical complexes [Sokolov-Sarbai Mining Production Association (SSGPO), a subsidiary of the Eurasian Natural Resources Corporation PLC (ENRC)]	Qostanay	25,000,000
Lead:			
Mining, recoverable Pb content of ore	Kazzinc JSC:	Locations:	
	Ridder:		
	Shubinsky Mine	East Kazakhstan	461
Do.	Tishinsky Mine	do.	15,000
Do.	Zyrianovsk:		
	Grekhovsky Mine	NA	240,000
Do.	Maleevsky Mine	NA	35,100
Mining, gross weight Pb-Zn ore	ShalkiyaZinc N.V.	Kyzylorda region	3,000,000
Processing, recoverable Pb content of ore	Kazzinc JSC: Ridder concentrator	East Kazakhstan	NA
Do.	ShalkiyaZinc N.V. processing plant	Kentau	NA
Metal	Chimkent smelter	Shymkent	60,000
Do.	Kazzinc JSC: Ust-Kamenogorsk lead smelter	Oskamen	168,000
Magnesium, metal	Ust-Kamenogorsk titanium-magnesium plant	do.	23,000
Manganese, crude ore	Facilities:	Locations:	2,550,000[3]
	Atasurda	Atasu	
	Kazmarganets [Kazchrome, a subsidiary of Eurasian Natural Resources Corporation PLC (ENRC)]	Tur, East Kamys Mines (Karaganda region)	
	Sary-Arkapolimetal	Zhayrang region	
	Zhezdy processing plant [Kazchrome, a subsidiary of Eurasian Natural Resources Corporation PLC (ENRC)]	Zhezdy	
Molybdenum:			
Mining, recoverable content of ore	Kazakhmys PLC facilities:	Locations:	6,000[3]
	Balkhash complex	Kounrad Mine	
	Karaobinskoye deposit	Karaoba region	
	Sayak deposit	Sayaq (Sayak) region	
Metal	Akchatau molybdenum metal plant	Zhezkazgan region	NA
Natural gas million cubic meters	Companies:	Locations:	16,000[3]
	CNPC Aktobemunaigaz	Aqtobe	
	Embamunaigaz	Emba District	
	Hurricane Kumkol Munai	Aral Sea region	
	Karachaganak Petroleum Operating BV	Northwestern Kazakhstan	
	Mangistaumunaigaz	Mangghyshlaq Peninsula	
	Tengizchevroil joint venture	Tengiz deposit	
		Zhanazhol deposit	
		Urikhtau deposit	
	Agip Kazakhstan North Caspian Operating Co. (AGip KCO)	Kashagana offshore field	
	Uzenmunaigaz	Uzen deposit	
Petroleum:	Companies:	Locations:	32,000,000[3]
Crude	CNPC Aktobemunaigaz	Aqtobe	
	Embamunaigaz	Emba District	
	Hurricane Kumkol Munai	Aral Sea region	
	Karachaganak Petroleum Operating BV	Karachaganak field	
	Mangistaumunaigaz	Mangghyshlaq Peninsula	
	Uzenmunaigaz	Uzen deposit	
Do.	Alibekmola, Ayrankul, Chinarevskoye, Kozhasay, North Buzachi, Sazankurak, Saztyube, and Urikhtau deposits	NA	NA

See footnotes at end of table.

TABLE 2—Continued

KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Petroleum—Continued:				
Crude—Continued	42-gallon barrels per day	Tengizchevroil joint venture	Tengiz deposit	400,000
Do.	do.	Agip Kazakhstan North Caspian Operating Co. (AGip KCO)	Kashagan offshore field	100,000
Refined, crude oil throughput	do.	Atyrau Pavlodar, Shymkent refineries	Atyrau, Pavlodar, Shymkent, respectively	427,000 [3]
Phosphate rock		Companies:	Locations:	
		Chilisay mining directorate	Aqtobe phosphorite basin	10,000,000 [3]
		Karatau production association	Shymkent and Zhambyl regions	
Rare metals (columbium, indium, selenium, tellurium)		Aktau complex	Aktau	NA
Do.		Belogorsky rare metals plant	Belogorskiy	NA
Do.		Chimkent metallurgical plant	Shymkent	NA
Do.		Ust-Kamenogorsk lead-zinc plant (Kazzinc)	Oskamen	NA
Do.		Akchatau mining-beneficiation complex	Zhezkazgan region	NA
Rhenium		Balkhash copper mining-metallurgical complex (Kazakhmys PLC)	do.	NA
Silver, refined		Facilities:	Locations:	1,000 [3]
		Chimkent metallurgical plants	Shymkent	
		Ridder (Kazzinc)	Ridder	
		Ust-Kamenogorsk (Kazzinc)	Zhezkazgan region	
Tantalum		Ulba metallurgical plant JSC (UMP) (Kazatompom)	Oskemen	NA
Tin		Akchatau mining-beneficiation complex	Akzhaik deposit, Zhezkazgan	700
Titanium:				
Ore, ilmenite		Obukhovskoye, Satpayevskoye, and Shokashsk deposits	NA	30,000
Metal		Ust-Kamenogorsk titanium-magnesium plant	Oskamen	35,000
Uranium, U content		National Atomic Compay Kazatomprom affiliated companies:	Locations:	7,000 [3]
		Akbastau JV	Budenovskoye deposit, Sozak region	
		Appak LLP	Mynkuduk deposit, Mynkuduk region	
		Baiken-U LLP	Khorassan deposit, Kyzylorda region	
		Betpak Dala JV, consisting of Akdala mine and Site No. 4 mine of Inkai deposit	Southern Kazakhstan	
		Karatau LLP	Budenovskoye deposit, Sozak region	
		Katco JV, consisting of Site No. 1 Yuzhnyi and Site No. 2 Tortkuduk of Moinkum deposit	Southern Kazakhstan	
		Kyzylkum LLP	Khorassan deposit, Kyzylorda region	
		Mining Group No. 6 LLP	NA	
		Prikaspiskiy ore enrichment center	Aqtau	
		Semizbai-U	Semizbai deposit, interface of Northern Kazakhstan and Akmola	
		Shevchenko	Aqtau	
		Stepnogorskyi mining-chemical complex, Shantobe Mine	Vostok and Zvezdnoe deposits, west of Stepnogorsk	
		Stepnoye Mining Group LLP	NA	
		Taboshara	Taboshara	
		Taukent Mining Chemical Plant LLP	NA	
		Tselinny chemical complex	Stepnogorsk	

See footnotes at end of table.

TABLE 2—Continued
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Uranium, U content—Continued	National Atomic Company Kazatomprom affiliated companies—Continued:	Locations:	
	Ulba metallurgical plant JSC (UMP)	Oskemen	
	JV Zarechnoye JSC	Zarechnoye deposit, Olrarski region, South Kazakhstan	
	National Atomic Company Kazatomprom mines:	Locations:	
	Kanzhugan, Moinjum, Uvanas	Chu-Sarysu uranium ore province	
	Northern Karamurun, Southern Karamurun	Srydarya uranium ore province	
	Vostok	Northern Kazakhstan uranium ore province	
Zinc:			
Mining, recoverable, Zn content	Kazakhmys PLC mines:	Locations:	
	East Region:		
	Artemyevskoe Mine	East Kazakhstan	30,200
Do.	Belousovskoe Mine	do.	8,420
Do.	Irtyshskoe Mine	do.	14,700
Do.	Nikolaevskoe Mine	do.	48,700
Do.	Orlovskoe Mine	do.	78,200
Do.	Yubileyno-Snegirikhinskoe Mine	do.	16,500
Do.	Karaganda Region: Abyz Mine	North-central Kazakhstan	20,800
	Kazzinc JSC:	Locations:	
	Ridder:		
Do.	Ridder-Sokolny Mine	East Kazakhstan	NA
Do.	Shubinsky Mine	do.	2,510
Do.	Tishinsky Mine	do.	79,500
Do.	Shaimerden deposit	North Kazakhstan	1,090,000
	Zyrianovsk:		
Do.	Grekhovsky Mine	East Kazakhstan	240,000
Do.	Maleevsky Mine	do.	203,000
Mining, Zn content of Pb-Zn ore	ShalkiyaZinc N.V.	Kyzlordo region	100,000
Processing, recoverable, Zn content	Kazakhmys PLC mines:	Locations:	
	East Region:		
	Artemyevskoe Mine	do.	8,580
Do.	Belousovskoe Mine	do.	5,760
Do.	Irtyshskoe Mine	do.	7,610
Do.	Nikolaevskoe Mine	do.	24,200
Do.	Orlovskoe Mine	do.	55,000
Do.	Yubileyno-Snegirikhinskoe Mine	do.	6,190
Do.	Kazzinc JSC:	Locations:	
	Ridder concentrator	do.	NA
Do.	Shaimerden deposit	North Kazakhstan	72,000
Metal	Ridder zinc refinery	East Kazakhstan	126,000
Do.	Ust-Kamenogorsk zinc refinery	North Kazakhstan	240,000

[e] Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

[1] Table includes data available through March 31, 2009.

[2] Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

[3] Capacity estimates are totals for all enterprises that produce that commodity.

THE MINERAL INDUSTRY OF KYRGYZSTAN

By Richard M. Levine and Glenn J. Wallace

During the Soviet period, Kyrgyzstan's mining industry was based on the extraction of antimony, mercury, rare-earth elements, and uranium. The country was the main producer of mined mercury and of antimony and mercury metal during the Soviet period. Production of antimony and mercury was currently being conducted at a much lower level and production of rare earths and uranium had ceased. The Kara-Balta mining and processing complex that used to process uranium until the dissolution of the Soviet Union switched to processing as much as 25 metric tons per year (t/yr) of gold and silver combined.

Kyrgyzstan does not possess large oil and gas reserves, but it does produce some oil and gas. Coal mining has been conducted since the early 1900s when Kyrgyzstan was the main supplier of coal in the Central Asia region, but coal production was no longer substantial and provided less than 25% of the country's coal consumption. Following the dissolution of the Soviet Union, the country's leading mineral sector became the gold mining sector with the development of the Kumtor gold deposit by Canada's Cameco Corp., which concluded an agreement for the development of Kumtor with the Kyrgyzstan Government in 1994. In 2004, all Cameco's assets were transferred to the Canadian company Centerra Gold, Inc.

Minerals in the National Economy

In 2007, the mining sector contributed 10.2% of the country's gross domestic product (GDP), 48.4% of the country's industrial output, and 11% of the tax revenue collected (Zubkov, 2007). The Kumtor Gold Co., which was a subsidiary of Centerra Gold, was the country's leading mineral producing enterprise. According to the Kyrgyzstan National Statistics Committee, in 2007, Kumtor Gold accounted for 2.5% of the GDP and 13.1% of total industrial output (Lymar, 2008).

Production

In 2007, Kyrgyzstan experienced an 8.2% increase in the GDP and a 9% increase in industrial production compared with that of 2006, which was partly the result of higher gold prices on the world market (U.S. Central Intelligence Agency, 2008; Natsional'nyy Statisticheskiy Komitet Kyrgyzskoy Respubliki, 2009). In 2007, gold production by Kumtor Gold decreased by less than 1%. Coal production increased by more than 10% but was still almost 90% below production levels attained at the time of the dissolution of the Soviet Union. Data on mineral production are in table 1.

Structure of the Mineral Industry

Centerra Gold owned 100% of the Kumtor gold mine through its wholly owned subsidiary Kumtor Gold. Besides Centerra Gold, the country's main mining enterprises were the Kadamzhay antimony mining and metallurgical complex, the Khadarkan mercury mining and metallurgical complex, and the Makmal gold mining complex. The Makmal Gold mining enterprise was managed by the Kyrgyzaltyn Joint Stock Company, which was wholly owned by the Kyrgyzstan Government.

Mineral Trade

Kumtor Gold accounted for more than 35% of the value of Kyrgyzstan's exports. In 2006 (the latest year for which data were available), mineral products played a large role in the country's exports. Precious metals and their products accounted for 27.3% of the total value of exports for the first 11 months of the year; the category mineral products, 21.7%; and products made from stone, gypsum, cement, and glass and its products, 5.9%. Kyrgyzstan's main imports were in the category mineral products, which was composed of coal, natural gas, and petroleum refinery products and made up 32% of the total value of imports for the first 11 months of the year, and the category nonprecious metals and their products, which accounted for 6.1% of the total value of imports (Interfax Russia & CIS Statistics Weekly, 2007).

Commodity Review

Metals

Antimony and Fluorspar.—Kyrgyzstan had been the third ranked producer of antimony in the world after China and Bolivia in 1990, but its deposits were significantly depleted. The country's Kadamzhay antimony mining and metallurgical complex was a vertically integrated antimony production complex that mined the Kadamzhay and the Terek deposits. The complex contained two mines (the Kadamzhay and the Terek-Sayskiy), beneficiation plants, and the Kadamzhay metallurgical plant that produced metallic antimony and compounds. With the development of large antimony reserves in Russia and Tajikistan, ore production at Kadamzhay decreased. The Kadamzahy complex did not operate in 2004 and, in 2005, it was privatized. The new owners engaged in investing in technically reequipping the plant and in infrastructure development for the mines.

From mid-2005 until November 2006, Kadamzhay ceased producing its core products because it was not able to obtain raw material supplies from the Anzob mining and beneficiation plant in Tajikistan, which had been its main raw material supplier. To resolve its raw material supply problem, in 2006, the Kadamzhay metallurgical plant oriented its production to processing concentrate from Russia. In the fall of 2006, Kadamzhay began receiving its supplies of raw materials from the Chita region in Russia, which enabled the plant to resume stable operations. Plans called for the Kadamzhay plant to produce between 3,000 to 5,000 t/yr of antimony metal and its compounds.

Despite more than 70 years of development, Kadamzhay still had a large quantity of reserves in deposits that had not been mined, which included deposits that the complex was keeping in reserve. These reserves, however, had not yet been reevaluated on the basis of market economy criteria rather than the criteria that had been used in Soviet times. In the summer, ATF Invest (a subsidiary of the ATF Bank Kazakhstan) purchased a 70.04% stake in the Kadamzhay complex (Interfax Russia & CIS Metals and Mining Weekly, 2007a; Zubkov, 2007).

The Khaydarkan mercury mining and metallurgical complex mined the Khaydarkan and the Novoye deposits. These deposits also reportedly contain 107,700 metric tons (t) of antimony and 1.071 Mt of fluorspar reserves. Calcined antimony produced at Khaydarkan as a result of processing antimony-fluorspar concentrate was sent to Kadamzhay for processing and the fluorspar concentrate was sold to consumers (Zubkov, 2007).

Gold.—Kyrgyzstan had two main gold mining enterprises—Kumtor Gold and the Makmal gold mining enterprise. In 2007, Kumtor produced 300,862 troy ounces (9.36 t) of gold compared with 303,000 troy ounces (9.42 t) in 2006. In 2007, the Makmal gold mining complex produced about 1.1 t/yr of gold (Russian-American Chamber of Commerce in the USA, 2007). The decrease in gold production was partially offset by higher gold prices. The average sale price in 2007 was $696 per troy ounce compared with $594 per troy ounce in 2006 (Lymar 2008).

Kumtor Gold's plans for 2008 called for mining to be focused primarily in the south section of the central pit, which would target high-grade mineralization. In 2008, the mill head grade at Kumtor was expected to increase to an average 4.11 grams per metric ton (g/t). Production from the mine was expected to increase to between 580,000 troy ounces (18 t) and 620,000 troy ounces (19.2 t) of gold. The major increase in output was planned for the second half of 2008 when the high-grade SB zone of the south section would be exposed and mined. At yearend 2007, Centerra Gold reported that proven reserves at the Kumtor deposit were 1,223,000 troy ounces (38 t) of gold in 9,888 t of ore grading 3.8 g/t and probable reserves were 3,679,000 troy ounces (114.4 t) in 28,546 t of ore (Centerra Gold, Inc., 2008; Lymar 2008). In February 2008, it was reported that Kyrgyzstan's Financial Police had opened a criminal investigation of Centerra Gold and Kumtor Gold for allegedly avoiding paying taxes (Interfax Russia & CIS Metals and Mining Weekly, 2008a).

Mercury.—The Khaydarkan mercury mining and metallurgical complex mined the Khaydarkan and the Novoye deposits. Remaining reserves at the Khaydarkan deposit were reportedly 11,000 t of mercury, and at the Novoye deposit, 5,500 t. The Khaydarkan complex contained two underground mines, a beneficiation plant, and metallurgical processing facilities. Khaydarkan was producing about 500 to 600 t/yr of mercury in recent years, but this amount had fallen to 304 t in 2005. Future expansion of mercury production at Khaydarkan was limited owing to the limited quantity of primary mercury ore reserves. The majority of the remaining reserves at Khaydarkan were of complex ores from which it was more difficult to extract mercury. Plans called for the Government to privatize Khaydarkan in 2007 (Zubkov, 2007).

Industrial Minerals

Rare Earths.—Open pit mining of rare earths took place in Kyrgyzstan from 1960 through 1992 at the Kutessai II deposit, with the majority of rare-earth reserves still remaining. Of the remaining rare-earth reserves, 54.5% are of the cerium group and 43.7% are of the yttrium group. Until 1992, the complex had produced up to 120 types of rare-earth metal products, which included oxides of lanthanum and neodymium, oxides of the yttrium group, dioxides of cerium, and rare-earth alloys. During the beneficiation process, lead and molybdenum concentrates also were produced and sold. In 1995, the chemical-metallurgical plant was privatized and transformed to produce high-purity silicon. In 2006, a private firm purchased the license to continue developing the Kutessai II deposit. This firm was conducting a reevaluation of the reserves to determine the potential for economic production of rare earths (Zubkov, 2007).

Mineral Fuels and Related Materials

Coal.—Kyrgyzstan reportedly had about 2 billion metric tons of coal reserves, most of which required underground mining methods to extract. Coal production in the country had fallen sharply below the level in 1991 when Kyrgyzstan produced 3.1 Mt of coal. In 2007, Kyrgyzstan produced 353,200 t of coal and imported the majority of its coal requirements from Kazakhstan. Coal production in 2007 increased by more than 10% compared with that of 2006 and plans for 2008 called for coal production to increase by 14%. The country has the potential to sustain higher levels of coal production. A draft program for developing the coal industry submitted to the Government called for increasing coal output to 1 million metric tons per year in the period from 2008 to 2010 (Zubkov, 2007; Interfax Russia & CIS Metals and Mining Weekly, 2008b).

Uranium.—During the Soviet era, the Kara-Balta mining and processing complex, which includes a large hydrometallurgical facility near Bishkek, processed uranium concentrate from deposits in Kazakhstan and Kyrgyzstan for use in Soviet nuclear powerplants. The Kara-Balta plant also processed other metals besides uranium, including refined gold. Annual uranium production capacity of the facility was listed at 3,600 t of uranium (U). The facility had provided final processing for slurries from in situ leaching at mines in southern Kazakhstan. The Kara-Balta hydrometallurgical processing facility had been closed since 2004 owing to unstable raw material supplies from Kazakhstan (Wise Uranium Project, 2009).

Following Kyrgyzstan gaining independence, the Kara-Balta plant ceased processing uranium because of a lack of raw material. Uranium mining had ceased in Kyrgyzstan, and Kara-Balta did not process uranium again until 1994 when the Government reached an agreement with the Government of Kazakhstan to process uranium concentrate from the Stepnoye and the Tsentral'noye mining directorates in Kazakhstan into about 450 t/yr of U_3O_8. In 2000, the Russian Ministry of Atomic Energy restored ties with Kara-Balta, and in July 2000, Kyrgyzstan agreed to a joint-venture arrangement with Kazakhstan and Russia in which additional uranium concentrate from Kazakhstan's Zarechnoye deposit would be processed at Kara-Balta and supplied to the Russian nuclear industry. In 2004, Kazakhstan stopped supplying uranium to Kara-Balta, which caused uranium processing at the plant again to cease (Nuclear Threat Initiative, 2002). The Government of Kyrgyzstan tried several times unsuccessfully to sell the Kara-Balta plant in 2005 and 2006. In February 2007, Urals Platina Holding, which was part of the Russian-based Renova Group, bought the Kara-Balta complex (Nuclear Threat Initiative, 2007).

On July 17, 2007, Nimrodel Resources Ltd. completed the acquisition of 100% of Linia Prava Uranium (LPU), which was a joint-stock company registered in Kyrgyzstan. LPU held a 90% interest in four exploration licenses granted for Batken Oblast in the southern Fergana Valley in southwestern Kyrgyzstan. The licenses covered an area of more than 3,800 square kilometers (km^2), and LPU had been exploring actively in this area since 2005. In January 2008, LPU acquired a license to explore a 48-km^2 portion of the Mailuu-Suu district, which was a significant uranium mining area from 1946 to 1967. The area of the license includes 5 nonworking mines, 23 tailings dams, and 13 mullock sites. Geologic surveying was to be conducted around the five mines to investigate prospective uranium in the region. A program to drill tailings also was to be carried out in March and April 2008. Mineralogical and metallurgical testing then would be done to develop parameters for a production plant (Nimrodel Resources Ltd., 2009).

Outlook

The economic well being of Kyrgyzstan depends in part in the short term on the revival of gold production at Kumtor. Centerra Gold's plan to increase production by 48% to 52% to between 14 and 14.3 t in 2007 from 9.4 t in 2006 by mining higher grade ore is likely to bring gold output at Kumtor more in line with its historic average levels and, consequently, to bolster the country's GDP (Interfax Russia & CIS Metals and Mining Weekly, 2007b). Kyrgyzstan also appears to have the potential to resume mining and processing of uranium.

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TABLE 1
KYRGYZSTAN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
METALS						
Antimony:						
Mine output, Sb content[e]		40	20	10	50	30
Metal and compounds		1,308 [r]	1,504 [r]	1,600 [r]	1,500 [r]	1,000 [e]
Gold	kilograms	23,958 [r]	20,445 [r]	16,751 [r]	10,721	10,636
Mercury:						
Mine output, Hg content[e]		420 [r]	500 [r]	320 [r]	200 [r]	350
Metal	kilograms	369,800 [r]	488,100 [r]	303,500 [r]	168,900 [r]	331,500
Molybdenum, mine output, Mo content		370 [r]	488 [r]	400 [r, e]	400 [r, e]	400 [e]
Silver	kilograms	NA	11,700	NA	NA	NA
INDUSTRIAL MINERALS						
Cement		757,300	870,100	900,000	1,210,600 [r]	1,300,000 [e]
Clay	cubic meters	NA	966,600	NA	NA	NA
Fluorspar, concentrate[e]		3,973 [2]	3,038 [r, 2]	4,000	4,000	4,000
Gypsum		NA	14,000	NA	NA	NA
Kaolin[e]		381,100 [2]	400,000	400,000	400,000	400,000
Lime, dead-burned		8,700	11,200	9,500	9,500	9,500 [e]
Limestone		NA	445,050	NA	NA	NA
Rare earths:						
Concentrate, gross weight		NA	NA	NA	NA	NA
Rare earth oxide equivalent:						
Compounds		NA	NA	NA	NA	NA
Metals		NA	NA	NA	NA	NA
Other[e]		2,000	NA	NA	NA	NA
Salt[e]		1,100 [2]	1,100	1,100	1,100	1,100
Sand-gravel aggregate	cubic meters	NA	491,300	NA	NA	NA
Sands	do.	NA	485,600	NA	NA	NA
Stone:						
Building stone		NA	400,000	NA	NA	NA
Facing stone	cubic meters	NA	100,000	NA	NA	NA
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous		64,410	56,245	48,988	46,266	53,200 [e]
Lignite		351,988	397,347	285,763	267,620	300,000 [e]
Total		416,398	453,592	334,751	313,886	353,000 [e]
Natural gas	thousand cubic meters	27,000	28,169 [r]	25,000	19,000	19,000 [e]
Petroleum, crude	metric tons	68,050 [r]	73,293 [r]	74,400	70,600	35,300

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto.

NA Not available.

[1] Table includes data available through February 28, 2009.

[2] Reported figure.

TABLE 2
KYRGYZSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Antimony:			
Sb content of ore	Kadamzhay complex [ATF Invest (a subsidiary of ATF Bank of Kazakhstan), 70.4%]: Kadamzhay Mine Terek-Sayskiy Mine	Kadamzhayskiy Rayon	2,400 [3]
	Khaydarkan complex	Khaydarkan Region	
Ore	Kadamzhay beneficiation plant [ATF Invest (a subsidiary of ATF Bank of Kazakhstan), 70.4%]	Kadamzhay deposit	200,000
Do.	Terek-Sayskiy beneficiation plant	Terek-Sayskiy deposit	60,000
Metal and compounds	Kadamzhay metallurgical facility [ATF Invest (a subsidiary of ATF Bank of Kazakhstan), 70.4%]	Kadamzhayskiy Rayon	28,000
Cement	Kantskiy cement plant	Kant	1,500,000
Coal	Seven underground mines, five open pits, which include the following deposits: Almalyk, Dzhergalan, Kara-Kiche-Kok-Yangak, Kyzyl-Kiya, Sulyukta, and Tashkumyr	Southwestern, central, and northeastern parts of the country	2,200,000 [3]
Fluorspar, concentrate	Khaydarkan mining-metallurgical complex	Khaydarkan deposit	5,000
Gold:			
Au content of ore	Kumtor Gold Co. (Centerra Gold Inc.)	Kumtor deposit	22
Do.	Makmalzoloto (Kyrgyz Government, 100%)	Makmal deposit	3
Do. kilograms	Solton-Sary Mine	Naryn	500
Do.	Talas Gold	Jerooy, Talas Region	NA
Do.	Taldybulak Levoberezhny deposit	NA	NA
Au content of ore, open pit	Kyrgyzaltyn-Noroks Mining Company JV	Dzher-Uy deposit	650,000
Au content of ore, underground	do.	do.	350,000
Refined	Kara-Balta refinery	Chuskaya Oblast'	22
Mercury:			
Hg content of ore	Khaydarkan mining-metallurgical complex	Khaydarkan, Chauvi, Chonkoy, and Novoye deposits	700 [3]
Metal	do.	do.	1,000
Molybdenum, for nonmetallurgical uses	Kara Balta mining-metallurgical complex	NA	NA
Do.	Molibden Joint Stock Company	Chuskaya Oblast'	NA
Natural gas million cubic meters	Kyrgyzazmunayzat	Approximately 300 wells; Changyr-Tash, Chigirchik Pereval, Izbaskentskoye, Kara-Agach, Mayluu-Suu, Susahoye, and Togap-Beshkenskoye deposits (major)	100 [3]
Petroleum	do.	do.	150,000
Do.	Kyrgyz Petroleum Co.	Dzhalal-Abad Region	NA
Rare earths:			
Concentrates, gross weight	Aktyuzskiy mining directorate	Kutessai II and Aktyuz-Boordu deposits	14,000
Compounds and metals, rare-earth oxide equivalent	Kyrgyz chemical and metallurgical plant	Orlovka	8,000
Silver	Karagoyskoye deposit	Oshskaya Oblast'	NA
Do.	Kumyshtag deposit	Talasskaya Oblast'	NA
Tin	Enil'chek JSC mining enterprise	Atdzhaylau deposit	150
Do.	do.	Trudovoye deposit	350
Do.	Tyanshanolovo mining-beneficiation complex	Sary-Dzhas field	NA
Do.	Uchkoshkon deposit	do.	NA
Tungsten	Enil'chek JSC mining enterprise	Atdzhaylau deposit	90
Do.	do.	Trudovoye deposit	95,600

See footnotes at end of table.

TABLE 2—Continued
KYRGYZSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity
Uranium, processed	Kara-Balta mining-metallurgical complex	Zarechnoye deposit, Chuskaya Oblast'	3,600
Do.	Linia Prava (LPU) (Nimrodel Resources, 100%)	Southern Fergana Valley, Batken Oblast'	NA

Table includes data available through March 31, 2009.

[2] Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepencies in the names of enterprises and that of locations.

[3] Capacity estimates are totals for all enterprises that produce that commodity.

THE MINERAL INDUSTRY OF MACEDONIA

By Mark Brininstool

The mineral industry of Macedonia continued to increase its overall production in 2007. Macedonia's installed production capacities included those for the mining and processing of metals (mainly nonferrous) and of a variety of industrial minerals; mineral fuel production was limited to the production of lignite. Crude petroleum was imported and processed at the country's sole domestic refinery (table 1).

Minerals in the National Economy

Macedonia's real gross domestic product (GDP) grew by 5.9% in 2007 compared with the GDP in 2006. Manufacturing accounted for 18.4% of the GDP and mining and quarrying accounted for 0.7%. In 2007, mineral fuels made up 18.7% of the value of Macedonian imports and 4.9% of the value of exports, and raw materials (including ores and concentrates) other than fuels accounted for 5.6% of the value of imports and 5.1% of the value of exports. The total values of Macedonian imports and exports in 2007 were $5,227 million and $3,356 million, respectively (Republic of Macedonia State Statistical Office, 2008a, p. 2; 2008b, p. 1-3).

Production

Mineral production generally showed significant increases in 2007 as the industry continued to develop. Significant increases in the production of metals included that of lead content of concentrate, which increased by 190.9%; zinc content of concentrate, by 81.8%; nickel, by 40%; ferrosilicon, by 33.7%; gold, by 12.5%; and crude steel, by 3.2%. Among the industrial minerals, production of talc increased by 73%; bentonite, by 8.4%; and cement, by 4%. Production of crushed stone, gypsum, and lime decreased by 47.8%, 4.6%, and 40.8%, respectively. Among the mineral fuels, lignite production decreased by 1% and output of petroleum refinery products increased by 2%.

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

Outlook

Mineral production in Macedonia could continue to increase if facilities previously operating below capacity increase production, the country's overall economic situation improves, and foreign direct investment increases.

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TABLE 1
MACEDONIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003[e]	2004	2005	2006	2007
METALS						
Cadmium, smelter output	kilograms	75 [3]	--	--	--	--
Copper, mine and concentrator output:						
Ore, gross weight	thousand metric tons	1,200	--	2,536	4,132	4,109
Concentrate:						
Gross weight		15,000	--	22,854 [r]	33,591 [r]	33,467
Cu content		2,567 [3]	--	6,000 [r, e]	8,000 [r, e]	7,300 [e]
Gold[e]	kilograms	400	--	400 [r]	400 [r]	450
Iron and steel:						
Ferroalloys:						
Ferronickel (22% Ni), gross weight[e]		25,300 [r]	24,100 [r]	37,000 [r]	49,700 [r]	69,600
Ferrosilicon		50,000	56,000 [e]	71,249	59,023	78,892
Total		75,300 [r]	80,100 [r, e]	108,249 [r]	108,723 [r]	148,492
Steel, crude		296,105 [r, 3]	313,594 [r]	325,690 [r]	360,304 [r]	371,930
Semimanufactures		291,354 [r, 3]	309,154 [r]	319,123 [r]	353,964 [r]	366,076
Lead:						
Mine output, concentrate, Pb content		5,000 [3]	--	--	11,000 [r]	32,000 [e]
Metal, primary and secondary:						
Smelter		3,500	--	--	--	--
Refined		8,000 [3]	--	--	--	--
Nickel, Ni content of FeNi[4]		5,555 [r, 3]	5,300 [e]	8,141 [r]	10,942 [r]	15,321
Silver[e]	kilograms	10,000	--	--	--	--
Zinc:						
Concentrate, Zn content		4,000	--	--	11,000 [r]	20,000
Metal, refined, primary and secondary		15,100	--	--	--	--
INDUSTRIAL MINERALS						
Cement	thousand metric tons	768 [3]	820	827 [r]	867 [r]	902
Clays, bentonite		25,000	25,000 [e]	25,767 [r]	32,507 [r]	35,234
Diatomite[e]		5,000	5,000	5,000	5,000	5,000
Feldspar, crude		21,000	22,925 [r]	27,076	32,824 [r]	32,814
Gypsum, crude		150,000	165,416 [r]	190,232	267,760	255,500
Lime		10,000 [r]	10,000 [r]	15,009 [r]	12,704 [r]	7,517
Pumice and related materials, volcanic tuff[e]		50,000	50,000	50,000	50,000	50,000
Sand and gravel, excluding glass sand[e]	thousand cubic meters	100	100	100	100	100
Stone, excluding quartz and quartzite:						
Dimension, crude[e]	square meters	150,000	150,000	150,000	150,000	150,000
Ornamental[e]	thousand cubic meters	300	300	300	300	300
Crushed and broken, n.e.s.[5]	cubic meters	70,000 [r]	72,378 [r]	125,154 [r]	111,829 [r]	58,369
Other[e]	thousand metric tons	25,000	25,000	25,000	25,000	25,000
Talc, crude		1,000 [r]	1,000 [r, e]	1,955 [r]	1,025 [r]	1,775
MINERAL FUELS AND RELATED MATERIALS						
Lignite	thousand metric tons	8,360 [3]	7,296 [r]	6,880	6,639 [r]	6,569
Petroleum, refinery products	do.	800 [r]	837 [r]	919 [r]	1,022 [r]	1,042

[e] Estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through March 31, 2009.

[2] In addition to commodities listed, secondary aluminum in small amounts and common clay also are produced, but available information is inadequate to make reliable estimates of output.

[3] Reported figure.

[4] Production of nickel ore, gross weight, estimates were not made in 2007 because of a lack of information, but a substantial portion of nickel ore comes from the Rzanovo Mine and is blended with higher-grade imported ore for final production.

[5] Not elsewhere specified.

TABLE 2
MACEDONIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity^e
Cement	Usje Cementarnica AD (Titan S.A., 95%)	Plant at Skopje	1,000
Chromite, concentrate	Jugohrom, Hemijsko-Elektrometakurski Kombinat (HEK)	Concentrator at Radusa	150
Copper ore	Bucim Mine (Solway Management)	Mine and mill at Bucim, near Radovis	4,100
Ferroalloys, ferrosilicon	SILMAK	Plant at Jegunovce	80
Iron ore	Skopje, Rudnici i Zeljezarnica Skopje	Mines at Tajmiste, Demir Hisar, and Damjan	1,000
Lead metal	MHK Zletovo	Imperial smelter at Titov Veles	40
Do.	do.	Refinery at Titov Veles	40
Lead-zinc, concentrate	Sasa (Solway Management)	Mill near Kamenica	65
Lead-zinc ore	do.	Mine near Kamenica	1,000
Do.	Zletovo (Indo Minerals and Metals DOOEL)	Mine and mill near Probistip	500
Do.	Toranica (Indo Minerals and Metals DOOEL)	Mine near Dolga Livada	100
Nickel:[1]			
Ore	Feni Industries (Cunico Resources)	Mine and opencast mine near Kavadarci	2,300
Do.	do.	Opencast mine at Rzanovo	NA
Metal	do.	Ferronickel plant at Kavadarci	16
Petroleum, refined	OKTA A.D. Skopje (EL.P.ET Balkanike, 81.51%)	Oil refinery at Skopje	2,500
Steel, crude	Makstil A.D. Skopje (Duferco Group, 54.4%)	Plant at Skopje	360
Zinc metal	MHK Zletovo	Imperial smelter plant and refinery at Titov Veles	65

Do., do. Ditto. NA Not available.

[1] Nickel in ferronickel.

THE MINERAL INDUSTRY OF MALTA

By Harold R. Newman

In 2007, Malta remained an important transshipment center in the Mediterranean area. Its political and strategic importance has traditionally been linked to its geographic position in the center of the Mediterranean Sea and its natural deepwater harbor. The mineral-related economy of the country depended mainly on trade and the storage of crude oil in the Malta Freeport. The Malta Freeport offers modern transshipment facilities, which include storage, assembly, and processing operations, and an oil terminal with bunkering facilities. The transshipment and reexport of goods continued to be significant to the country's economy.

The Maltese Islands are composed of Tertiary limestone with some clays and small areas of surface Pleistocene deposits. The limestone is similar to the carbonates of the Ragusa region of Sicily and those of the Sirte Basin in Libya. The oldest formation is the Lower Coalline limestone, which is massive and consists of yellow biomicrites rich in benthonic foraminifera. It is overlain by the Lower, Middle, and Upper Globigerina formation of Miocene age, which is a pale-yellow limestone composed almost entirely of planktonic foramininifera. The Middle Globigerina formation provides the Maltese building stone (Sammut, 2003).

Production

The mineral industry, which consisted mainly of the quarrying of golden limestone (globigerina) and solar salt production, all for domestic consumption, was small (table 1). Malta depended almost completely on imports of raw materials and fuels.

Structure of the Mineral Industry

Numerous stone quarries operated on the islands of Gozo and Malta. Detailed information about these quarries was not available.

Commodity Review

In 2007, Mediterranean Oil and Gas plc of the United Kingdom announced that the seismic surveying vessel *MV Geomariner* of Seabird Exploration Inc. had begun about 1,000 kilometers of two-dimensional seismic work in Area 4, which is located offshore between Libya and Malta in an underexplored petroleum province. Area 4 covers an area of more than 5,000 square kilometers (km^2) with water depths of about 400 meters. The identified prospects were Hagar Qim, Luzzu, Skorba, and Tarxien. Although the area was considered to be an extension of the Libyan and Tunisian offshore hydrocarbon provinces, petroleum exploration efforts, so far, were unsuccessful. The survey was paid for by Leni Gas and Oil plc of the United Kingdom as part of a $5 million farm-in agreement that would earn Leni a 20% interest in Area 4 (Offshore Engineer, 2007).

The Government awarded Heritage Oil Corp. of Canada a license for natural gas and petroleum exploration in two offshore areas located south and southeast of Malta with a total area of 18,000 km^2. These areas were previously held by Nopec TGS of Norway. Heritage planned to spend about $22 million in the next 3 years with a focus on detailed seismic work and the drilling of one exploration well. If gas or oil is found, production would be shared between the Government and Heritage (Alexander's Gas & Oil Connections, 2008).

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TABLE 1
MALTA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Cubic meters)

Commodity[3]	2003	2004	2005	2006	2007
Limestone	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
Salt	13,000	6,000	6,000	6,000	6,000

[1] Estimated data are rounded to no more than three significant digits.

[2] Table includes data available through April 30, 2008.

[3] In addition to the commodities listed, small amounts of cement, fertilizer, lime, and plaster are produced, but available information is inadequate to make reliable estimates of output.

THE MINERAL INDUSTRY OF MOLDOVA

By Richard M. Levine and Glenn J. Wallace

Moldova had a small mineral industry that was primarily engaged in the mining and production of industrial minerals and mineral products, including cement, clays, dimension stone, gypsum, limestone, industrial sand, and sand and gravel. Moldova had a steel minimill in Ribnita (the Moldova Steel Works), which had the capacity to produce more than 1 million metric tons per year (Mt/yr) of crude steel and 960,000 metric tons per year (t/yr) of rolled products. Moldova was dependent on imports for all its coal, natural gas, and oil supplies, which came mainly from Russia (U.S. Central Intelligence Agency, 2008).

The country's main mineral resources were of industrial minerals to produce construction materials and for use in the cement, chemical, glass, and food processing industries. Small deposits of iron ore, natural gas, and oil have been explored but were not economic to develop. According to assessments as of January 1, 2007, reserves of industrial minerals had been determined for 17 types of industrial minerals in 423 deposits, of which 176 deposits were being mined and 56 deposits were prepared for development but were being kept in reserve by the Government until conditions were deemed suitable for their development. Argillaceous and carbonate rocks were extracted for cement production, and blast furnace slag, gypsum, and pyrite cinders were used as additives in cement production. Raw materials for cement production were based in two clay and two limestone deposits, which had adequate reserves to provide these raw materials for cement production for 50 years at the 2006 level of output (Zhalalite and others, 2007).

Moldova had been experiencing a continuing shortage of high-strength gravel and stone. The country was mining granite at one deposit, the Kosoutskoye, which in 2006 produced 130,000 cubic meters; this amount was not adequate to meet Moldova's requirements for high-strength construction stone. Also in 2006, out of 125 explored sand and gravel deposits, 71 were being mined with the capacity to produce 925,000 cubic meters of sand and gravel. Although this amount was three times greater than the amount produced in 2000, it was significantly less than the country produced in 1990. Of 105 known deposits containing reserves of clay and loam suitable as raw material for bricks, ceramic drainage pipes, and tiles, 11 deposits of ceramic raw materials were under development. Of 16 explored deposits of porous clay filler (keramzit) for cement, 2 were under development (Zhalalite and others, 2007).

Production

In 2007, the gross domestic product was estimated to have increased by 3% compared with that of 2006 (U.S. Central Intelligence Agency, 2008). The value of industrial production in Moldova decreased by 6.9% compared with that of 2006, but cement production increased by 26.7% and crude steel production increased by 47.3% (Interfax Russia & CIS Statistics Weekly, 2008). The large increase in cement production was accompanied by a large increase in limestone production, which suggests the opening of a limestone quarry in 2006. Data on mineral production are in table 1.

Structure of the Mineral Industry

Practically all mineral production enterprises were stock companies that had the participation of foreign enterprises (Zhalalite and others, 2007). Table 2 is a list of major mineral industry facilities.

Commodity Review

Metals

Iron and Steel.—The country's only steel mill was located in the region of Transnistria, which is a territory within the internationally recognized boundaries of the Republic of Moldova. A separatist movement in Transnistria declared the territory's independence as a separate republic of the U.S.S.R. on September 2, 1990. Although the separatist Transdniester Moldovan Republic (also known as Pridnestrovian Moldavian Republic) continued to exercise effective control over most of Transnistria, its independence had not been recognized by Moldova or internationally. The steel mill was Transnistria's leading industry and accounted for about 50% of the region's budget revenues, and steel was one of Transnistria's major exports.

In July 2007, the U.S. International Trade Commission determined that revoking an existing antidumping duty order on steel-reinforced concrete bars from Moldova (among a number of other countries) would likely lead to a continuation or recurrence of material injury within a reasonably foreseeable timeframe. Therefore, the antidumping duty order was to remain in place (U.S. International Trade Commission, 2007).

Industrial Minerals

Gypsum.—In the northern part of Moldova, two gypsum deposits had been explored, of which one, the Kirovskoye, had been mined since 1958; the other was being held in reserve. As of January 1, 2007, explored gypsum reserves in the Kirovskoye deposit reportedly were 16 million metric tons (Mt), and 25 Mt of explored gypsum reserves were contained in other deposits being held in reserve. With the creation of the Moldovan-German Chinisau Municipal Council (CMC)-Knauf AG joint venture in 2006, gypsum production reached more than 725,000 metric tons (t) in 2006 and more than 846,000 t in 2007. A portion of gypsum production was exported (Zhalalite and others, 2007).

Outlook

The mineral industry of Moldova is likely to continue to be centered on the production of industrial minerals and steel. The country has very limited resources of hydrocarbons and iron ore, and its only significant mineral resources are of industrial minerals used in the cement, chemical, construction materials, food processing, and glass industries. To significantly increase its production of industrial minerals, Moldova would have to increase its investment in exploration significantly, which would probably require the country to establish additional cooperative projects with foreign partners (Zhalalite and others, 2007).

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TABLE 1

MOLDOVA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
METALS						
Crude steel		886,000	1,012,600	1,016,000 [r]	675,400	995,000
INDUSTRIAL MINERALS						
Cement		255,400	439,700	641,000	837,000	1,060,000
Clays, unspecified		--	--	--	227,968	165,040
Gypsum		116,100	102,500	562,700	725,900	846,400
Lime		2,880	1,911	1,900	2,153 [r]	1,135
Limestone		--	--	--	15,333	166,870
Sand and gravel[e]		1,000,000	1,600,000	1,900,000	289,042 [r, 2]	272,197 [2]
MINERAL FUELS AND RELATED MATERIALS						
Natural gas, dry	million cubic meters	NA	NA	NA	56	NA
Peat[e]		475,000	475,000	475,000	475,000	475,000

[e]Estimated; estimated data are rounded to no more than three significant digits. [r]Revised. NA Not available. -- Zero.

[1]Table includes data available through February 28, 2009.

[2]Reported figure.

TABLE 2

MOLDOVA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1]

(Metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location or deposit names	Annual capacity[e]
Cement		S.A. Ciment Rezina (joint venture with Lafarge S.A.)	Rezina	1,100,000
Granite	thousand cubic meters	Cariera de granit si pietris din Soroca S.A.	Cosauti	150
Gypsum		Chisinau Municipal Council (CMC)-Knauf AG (joint Moldovan-German venture)	Kirovskoye deposit	850,000
Oil and natural gas:				
Oil		Redeco Moldova oil and gas company [Resource Development Company, Ltd. (REDECO), 50%, and Costilla Energy, Inc., 50%]	Valeni oilfield	100,000
Natural gas	thousand cubic meters	do.	Victorovca gasfield	5,000
Sand and gravel	do.	NA	71 mined deposits	1,000
Steel, crude		OJSC Moldova Steel Works minimill [Rumney Trust Reg, 75%; Energy Investment and Management Corp. (EIM), 15.6%; Government, 9.4%]	Ribnita, Transnistria region	1,100,000

[e]Estimated; estimated data are rounded to no more than three significant digits. do. Ditto. NA Not available.

[1]Table includes data available through March 31, 2009.

THE MINERAL INDUSTRY OF MONTENEGRO

By Mark Brininstool

In 2006, Montenegro formally seceded from Serbia and Montenegro, which was the remnant of what was formerly known as Yugoslavia. Montenegro's mineral industry included the mining and processing of bauxite, dimension stone, and gravel. Metal production included alumina refining for primary aluminum smelting and steel output; mineral fuels production was limited to lignite and small amounts of brown coal (table 1).

According to the latest available data (2006), mining and quarrying contributed about 1.3% of the total gross domestic product. In 2007, the value of output of industrial minerals and metal ores (bauxite) increased by 78% and 1.2%, respectively; the value of coal and lignite production decreased by about 22%; and the value of mining and quarrying activities increased by 1.5% (Montenegro Statistical Office, 2008, p. 71, 117). In terms of volume, the production of bauxite increased by 1% compared with that of 2006. The output of aluminum, steel, and alumina increased by about 11%, 6.5%, and 1.5%, respectively, compared with that of 2006. Production of lignite decreased by about 20% (table 1). The total value of imports and exports of crude materials, except fuels, in 2007 was $53,989 thousand[1] and $52,223 thousand, respectively; the total value of imports and exports of mineral fuels and lubricants was $377,902 thousand and $10,427 thousand, respectively (Montenegro Statistical Office, 2008, p. 136).

Outlook

Montenegro's mineral production is expected to remain modest and will be used primarily to serve domestic economic needs.

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[1] Where necessary, values have been converted from European Union euros (€) to U.S. dollars (US$) at the rate of €0.73=US$1.00.

TABLE 1
MONTENEGRO: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
METALS						
Aluminum, gross weight:						
Alumina, calcined		239,739	245,005	235,196	236,740	240,186
Bauxite		540,051	610,000	672,345	659,370	667,053
Metal, ingot, primary		116,744	115,080	116,995	121,762	135,151
Iron and steel, crude steel		58,791 [r]	151,188 [r]	103,567 [r]	163,165 [r]	173,849
INDUSTRIAL MINERALS						
Gravel	cubic meters	77,198	43,087	47,948	82,933	92,914
Lime	thousand metric tons	8,136	10,591	6,008	8,118	7,089
Natural sand	cubic meters	352	--	--	--	--
Salt (sea water evaporate)		32,500	20,000	15,000	5,000	20,000
Stone, excluding quartz and quartzite, dimension, crude:						
Ornamental (marble blocks)	square meters	29,844	12,321	21,404	43,057	51,186
Crushed and broken, n.e.s.[3]	cubic meters	49,981	41,936	92,506	98,360 [r]	161,970
Other, stone products	do.	40,399	33,919	26,149	54,191 [r]	60,165
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Brown		--	--	9,000	10,000	7,000
Lignite		1,618,000	1,514,000	1,288,016	1,502,334	1,195,515

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. do. Ditto. -- Zero.

[1]Table includes data available through February 28, 2009.

[2]In addition to commodities listed, common clay and diatomite also are produced, and tellurium may be recovered as a copper refinery byproduct, but available information is inadequate to make reliable estimates of output.

[3]Not elsewhere specified.

THE MINERAL INDUSTRY OF THE NETHERLANDS

By Harold R. Newman

The Netherlands was an important regional producer of natural gas and petroleum for the European market and played a major role as a transshipment center for mineral products that entered and left continental Europe. In terms of world production, however, it was a modest producer of metallic and nonmetallic minerals and mineral products. The Dutch economy had a strong international focus, as the Netherlands was one of the European Union's (EU) leading centers of trade and industry. Owing largely to its favorable location by the North Sea, the country played a key role as a main port and distribution center for companies operating worldwide. The Netherlands was the EU's third ranked exporting country after Germany and France (Holland Trade, 2007).

Minerals in the National Economy

Rotterdam, which was the world's leading container port and a major European transportation hub, remained extremely important as a shipping and storage center. In 2007, the Port of Rotterdam was the first European port to break through the barrier of 400 million metric tons (Mt). A record 406 Mt of cargo (6.4% more than in 2006) passed through the Port of Rotterdam. The trade balance was down for crude oil (-2%) but up for mineral oil products (+24%) and ore and scrap (+4%). Throughput of incoming and outgoing materials in 2007 included crude oil (97 Mt), mineral products (57 Mt), ores and scrap (40 Mt), and coal (28 Mt) (Port of Rotterdam Authority, 2007).

Production

The Staatstoezicht op de Minjnen (SodM) [State Supervision of Mines], which is an agency within the Ministerie van Economische Zaken (Ministry of Economic Affairs), oversees the production of minerals in the Netherlands and the Netherlands part of the continental shelf. The agency is responsible for ensuring that mineral production is carried out in a responsible manner.

The mineral sector was dominated by natural gas and petroleum production, of which about 40% was from offshore. Mining was confined to the extraction of limestone, peat, and sand and gravel by quarrying and solution mining of salt in the eastern and northern areas of the country. Downstream activities included metallurgical and chemical industries, which used mainly imported ores and industrial minerals. Production of most mineral commodities did not change significantly in 2007. There was a small decrease in the production of aluminum and zinc and an increase in steel production. Those three commodities were among the more important mineral commodities produced in the country in 2007 (table 1).

Structure of the Mineral Industry

Mineral industry facilities were mostly privately owned, although the Government continued to be involved in the energy sector through regulation and oversight of petroleum and natural gas operations. Table 2 is a list of the major mineral industry facilities in the Netherlands.

Commodity Review

Metals

Aluminum.—Alcan Inc. of Canada announced that it would sell its Vlissinggen smelter to Klesh & Co. of the United Kingdom. Alcan held an 85% interest in the Vlissingen plant; the remaining 15% was held by Hunter Douglas NV, which also planned to sell its stake to Klesh. The terms of the purchase were not disclosed. The proposed sale of Vlissingen, which made billets for the European engineered products market, would include a commercial agreement that would ensure a continued supply of billet and sheet ingot to Alcan's engineered products plants (Metal Bulletin, 2007). If secondary aluminum was produced, it was not reported.

Zinc.—Nyrstar Budel B.V. was created in September 2007 with the merger of the lead and zinc assets of Umicore Zinc Alloys in Belgium and Ziniflex Ltd. in Australia. The zinc smelter at Budel produced zinc exclusively from zinc concentrates from Ziniflex's Century Mine in Queensland, Australia. The plant had the capacity to produce 260,000 metric tons per year (t/yr) of zinc using conventional roast-leach-electrowin technology and was considered one of Europe's most efficient zinc smelters in terms of metallurgical performance. Approximately 80% of total product sales was delivered to customers within 300 kilometers of the plant (Nyrstar Budel B.V., 2007).

Industrial Minerals

Calcium Carbonate.—Omya Netherlands BV's ground calcium carbonate (GCC) plant at Moerdijk started production in midyear 2005, and production continued through 2007. The initial capacity of the plant was 500,000 t/yr. GCC had become the leading filler in the production of wood-free paper owing to the paper's resulting pure white color and brightness. The marble used to produce the GCC was imported from Omya's mines in Turkey (Industrial Minerals, 2007).

Mineral Fuels and Other Sources of Energy

In energy supply, the Netherlands was active on the international scene in more than one respect. The country supplied energy to Europe, served as the entrepôt (transhipping center) for oil products for the whole of northwestern Europe, and was an advocate for sustainable energy practices. Onshore natural gas reserves and offshore petroleum and gas reserves in the North Sea have allowed the Netherlands to make a significant contribution to the European energy supply. However, crude oil production was decreasing by about 1% per year in the North Sea area. Although exploration activity had increased, it was slowed by the lack of available deepwater drilling rigs (Petroleum Economist, 2007b).

The Netherlands' two leading energy companies, Essent BV and Nuon BV, reported that they had reached an agreement to merge and form a new company worth $31.2 billion in equity. Essent and Nuon would hold a 55% and a 45% stake, respectively. The combined company, provisionally named EssentNuon, would be among the 10 leading energy companies in Europe with $17 billion in sales and 5 million customers. The Dutch competition authority, as well as the Provinces and municipalities that had shares in the companies, would still have to approve the merger officially (International Herald Tribune, The, 2007).

Natural Gas.—Vinci Construction Group of France, which was the world's leading construction company in terms of revenue, was selected to build a liquefied natural gas (LNG) terminal in Rotterdam for oil-storage company Royal Vopak BV and pipeline manager Nederlandse Gasunie. The so-called Gate terminal would be able to convert between 8 billion and 12 billion cubic meters per year of LNG back to gas and was one of four facilities planned for Rotterdam as the Netherlands was seeking to become a hub for northwestern Europe. The Gate terminal was scheduled to open in 2010 (Bloomberg L.P., 2007).

The Government planned to spend up to 1.8 billion euros (€) ($2.3 billion) on new gas-network capacity over the next few years. Domestic natural gas production was declining, and expanding the transport network would enable Nederlandse Gasunie to import more natural gas and export any surplus gas. The investment would include laying about 450 kilometers (km) of pipeline as well as the construction of several compressor stations. It was expected that the proposed infrastructure would enable new suppliers to enter the market and create access to the LNG market. The LNG supply was expected to surge when Gasunie's Gate import terminal starts operating in 2010 (Petroleum Economist, 2007a).

Renewable Energy.—Econcern NV and Eneco Energie NV were proceeding with the development of the €383 million ($498 million) Q7 wind park development, which would be located 23 km from the Dutch North Sea coast. It was the farthest offshore wind park in the world. Wind energy was expected to be an important source of renewable energy in the Netherlands as well as throughout Europe; more offshore wind farms are likely to be built off European coastlines as Governments seek to increase the use of renewable energy without angering their citizens by placing giant turbines on their doorsteps (Hudson, 2007).

Outlook

The Port of Rotterdam is expected to continue to be a leading European port, particularly in terms of container traffic, and to play a very important role in the European import and export market. Almost as much cargo is expected to pass through Rotterdam as the numbers two, three, and four ports in Europe—Antwerp, Hamburg, and Marseille—combined. The trend toward increased use of the Port of Rotterdam for cargo handling is expected to continue. A significant percentage of the cargo coming into the port will be processed at the port. The Netherlands is expected to continue to be an exporter of natural gas in the region.

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TABLE 1
NETHERLANDS: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007[e]
METALS						
Aluminum, metal:						
Primary		277,900	326,300	340,700	312,300	301,200 [3]
Secondary[e]		50,000 [3]	50,000	50,000	25,000 [r]	--
Cadmium, metal, primary		480 [r]	493 [r]	494 [r]	524 [r]	495 [3]
Iron and steel:						
Ore, sintered, from imports[e]		3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
Metal, pig iron, including blast-furnace ferroalloys (if any)		5,846,000	6,011,000	6,031,000	5,417,000	6,400,000
Steel:						
Crude		6,587,000	6,848,000	6,919,000 [3]	6,372,000	7,368,000 [3]
Semimanufactures		5,870,000	6,285,000	6,134,000	6,394,000	6,800,000
Lead, metal, refined, secondary[e]		22,000	20,000	17,000 [3]	17,000	16,000
Zinc, metal, primary		222,700	228,100	231,800 [3]	235,913	231,652 [3]
INDUSTRIAL MINERALS						
Cement, hydraulic[e]	thousand metric tons	2,450	2,380	2,400	2,400	2,400
Magnesium compounds:[e]						
Chloride		25,000	25,000	25,000	25,000	25,000
Oxide		10,000	10,000	10,000	10,000	10,000
Nitrogen, N content of ammonia	thousand metric tons	1,750	1,970	1,700 [e]	1,800 [e]	1,800
Salt, all types	do.	5,980 [r]	5,896 [r]	6,155 [r]	6,056 [r]	6,000
Sodium compounds, n.e.s.:[e, 4]						
Carbonate, synthetic		350,000	350,000	350,000	350,000	350,000
Sulfate:						
Natural		20,000	20,000	20,000	20,000	20,000
Synthetic		15,000	15,000	15,000	15,000	15,000
Sulfur:						
Elemental byproduct:						
Of metallurgy		131,000	137,000	141,000 [r]	111,000 [r]	115,000
Of petroleum and natural gas		408,000	410,000	400,000	400,000	400,000
Total		539,000	547,000	541,000 [r]	511,000 [r]	515,000
MINERAL FUELS AND RELATED MATERIALS						
Gas, dry natural:						
Gross	million cubic meters	85,714	101,099	83,498 [3]	84,000 [e]	76,440 [3]
Marketed[e]	do.	74,000	89,800 [r]	74,460 [3]	73,300 [3]	68,166 [3]
Petroleum:						
Crude	thousand 42-gallon barrels	17,134	15,564	11,858	11,426	11,250 [3]
Refinery products:						
Liquefied petroleum gas	do.	55,443	55,000 [e]	53,118	54,000	54,000
Gasoline, motor	do.	132,933	130,000 [e]	120,278	120,000 [r]	120,000
Naphtha and white spirit[e]	do.	90,000	90,000	90,000	90,000	90,000
Kerosene and jet fuel	do.	56,466	55,000 [e]	58,772	55,000	55,000
Refinery fuel and loss[e]	do.	27,046 [3]	30,000	30,000	30,000	30,000
Diesel oil	do.	155,086	150,000 [e]	157,563	150,000	150,000
Residual fuel oil	do.	79,862	80,000 [e]	79,771	80,000	80,000
Unspecified	do.	179,653	175,000 [e]	211,993	200,000	200,000
Total	do.	776,489	765,000 [e]	801,495	779,000 [r]	779,000

[e] Estimated; data are rounded to no more than three significant digits; may not add to total shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through October 31, 2008.

[2] In addition to the commodities listed, the Netherlands produced limestone, peat, and construction materials, such as sand and gravel, but output was not reported and information was not available to make reliable estimates of output.

[3] Reported figure.

[4] Not elsewhere specified.

TABLE 2
NETHERLANDS: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facility	Annual capacity
Aluminum:			
Billets	Pechiney Nederland NV (Alcan Inc., 85%)	Plant at Flushing (Vlissingen)	213
Primary	do.	do.	230
Do.	Corus Group	Smelter at Delfzijl	100
Secondary	Alumax Recycling BV	Smelter at Kerkade	50
Cadmium metric tons	Nyrstar Budel B.V. (Ziniflex Ltd.)	Plant at Budel-Dorplein	650
Calcium carbonate, ground	Omya Netherlands BV	Plant at Moerdijk	500
Cement	Eerste Nederlandse Cement Industrie NV (HeidelbergCement Group, 100%)	Plants at IJmuiden, Maastrict, and Rotterdam	3,700
Do.	Cementfabriek IJmuiden BV	Three plants at IJmuiden	1,600
Do.	Cementfabriek Rozenburg BV	Two plants at Rozenburg	920
Lead	Hollandse Metallurgische Industrie Billiton BV	Electrolytic plant at Arnhem	35
Do.	Billiton Witmetaal BV	Electrolytic plant at Naarden	6
Limestone	Ankerpoort NV (Lhoist SA, 100%)	Mines at Maastricht and Winterswijk	600
Magnesia	Nedmag Industries Mining & Manufacturing BV	Plant at Veendam	130
Do.	MAF Magnesite BV	Plant at Schiedam	40
Natural gas million cubic meters	Nederlandse Aardolie Maatschappij BV (NAM) (Exxon Mobil Corp., 50%)	Groningen, Leeuwarden, Assen, and other onshore gasfields and several offshore wells in the North Sea	225
Petroleum:			
Crude 42-gallon barrels per day	Amoco Inc., Conoco Inc., and Unocal Inc.	766 wells (204 producing) including North Sea fields: Haven, Helder, Helm, Hoorn, Kotter, Logger, and Rijn	83,500
Do. do.	Nederlandse Aardolie Maatschappij BV (NAM) (Exxon Mobil Corp., 50%)	Onshore fields: Berkel, DeLier, Ijselmonde, Meerkapelle, Pernis, Pinacke, Rotterdam, Schoonebeck, West, Werkendam, and Zoetemeer	20,500
Do. do.	Veba Oil and Gas Netherlands BV	Hanze field, North Sea	31,500
Refineries	Six companies, of which the major ones are:	Refineries, of which:	1,230,500
	Netherlands Refining Co. (BP p.l.c., 69%, and Chevron Corp., 31%)	Rotterdam	(446,000)
	Shell Nederland Raffinaderij BV	Pernis	(374,000)
	Esso Nederland BV	Rotterdam	(175,000)
	Total Raffinaderij Nederland NV	Vlissingen	(150,000)
Salt	Akzo Nobel Salt BV (Akzo Nobel NV, 100%)	Mines, of which:	4,100
	do.	Hengelo	(2,100)
	do.	Delfzijl	(2,000)
Sand, silica	Sigrano Nederland NV (Sibelco Group)	Mines and plants at Heerlin and Maastricht	500
Do.	Lieben Minërals BV	Mines at South Limburg	150
Sodium:			
Carbonate, synthetic	Brunner Mond Group	Plant at Delfzijl	380
Sulfate, synthetic	do.	do.	600
Steel	Corus Group	Plant at IJmuiden	7,000
Zinc	Nyrstar Budel B.V. (Ziniflex Ltd.)	Plant at Budel-Dorplein	260

Do., do. Ditto.

THE MINERAL INDUSTRY OF NORWAY

By Harold R. Newman

Norway has a varied geology with a broad spectrum of mineral resources for exploration and exploitation. Petroleum was Norway's most significant mineral commodity followed by, in order of value, industrial minerals and metals. The growth of its natural gas and petroleum sector has contributed significantly to the country's economy. The metals mining industry has declined owing to exhausted ore reserves. In addition to its rich natural gas and petroleum resources, Norway has hydroelectric power, which supplies the country's manufacturing and mineral-processing industries. The country's close proximity to the large European Union (EU) market was a competitive advantage for some raw materials, particularly aggregate, natural stone, and certain other industrial minerals.

Minerals in the National Economy

Norway's mineral resources included coal, iron ore, natural gas, nickel, olivine, petroleum, and titanium. The mining and quarrying industry was a regional industry that was strongly represented along the coast. About 80 million metric tons (Mt) of various mineral resources valued at $1.5 billion were extracted in 2007 by about 4,800 employees. The total export value for the mineral industry, excluding mineral fuels, was $871 million in 2007 (Norwegian Geological Survey, 2008, p. 5).

Production

Norway produced aluminum, cadmium, cobalt, copper, ferroalloys, nickel, and zinc metals. Mine production included feldspar, graphite, ilmenite, iron ore, and limestone. Aggregate and sand and gravel deposits were some of Norway's economically important mineral raw materials. Calcium carbonate, nepheline syenite, and olivine were the most important mineral products. Olivine is composed of two minerals: fayalite and forsterite. Fayalite is the iron-rich member and forsterite is the magnesium-rich member. Norway's production of olivine accounted for 66% of world production; the country's production of titanium accounted for 7.2% of world production; and its production of petroleum accounted for 6.2% of world production (Norwegian Geological Survey, 2008, p. 13).

The metals mining industry has declined owing to depleted ore reserves. Since the discovery of petroleum in the North Sea, petroleum production has become Norway's most important mineral industry activity, and petroleum was the country's most significant mineral commodity based on the value of exports (Norwegian Geological Survey, 2008, p. 3).

Structure of the Mineral Industry

The Norwegian mineral industry was composed of a mixture of Government and privately owned operations. Table 2 lists the major mineral companies that were operating in Norway in 2007, and their respective mine and (or) plant locations and capacities.

Commodity Review

Metals

Aluminum.—Alcoa Inc. of the United States announced that it had opened a new 280,000-metric-ton-per-year (t/yr) anode plant at its aluminum smelter in Mosjoen. The facility would produce anodes to be used in the Mosjoen aluminum smelter in Norway and the Fjardaal smelter in Iceland. Alcoa built the anode plant with managing partner Elkem Aluminium ANS, which had a 36% share in the new plant. Alcoa owned 50% of Elkem Aluminium, which operated smelters in Lista and Mosjoen. Alcoa stated that the new anode plant would enable the company to reduce production costs and maintain its competitiveness (Mbendi Information Services (Pty) Ltd., 2007).

Titanium.—Titania A/S was one of the world's leading producers of ilmenite with about 6% of world production. Titania supplied ilmenite to the European titanium pigment industry, which converts the black ilmenite to a white titanium dioxide pigment. Production from the Tellnes open pit mine was about 2 million metric tons per year (Mt/yr), which resulted in about 800,000 metric tons per year (t/yr) of ilmenite concentrate containing 44.7% titanium dioxide (Norwegian Geological Survey, 2007).

Industrial Minerals

Norway was a globally significant producer of industrial minerals from more than 30 mines. Norway's production of olivine accounted for 66% of world production, and that of ilmenite accounted for 14% of world production. Production of nepheline syenite was also globally significant. Aggregate, gravel, and sand were some of Norway's important raw materials. The Norwegian Geological Survey established a database that contains information on each of the country's deposits of aggregates, gravel, and sand, including each deposit's location, composition, quality, operating status, and volume (Norwegian Geological Survey, 2008, p. 12).

Mineral Fuels

Coal.—Norway continued to be a net coal exporter because of production from Store Norske Spitsbergen Grubekompani AS's two mines on Spitsbergen Island, north of the Norwegian mainland. Mine No. 7 was scheduled to close in 2010. About one-half of the mine's production was used in the country's only coal-fired powerplant on Spitsbergen Island. The Svea Nord Mine was expected to operate for up to 25 years. Estimated coal reserves were between 35 Mt and 45 Mt. Coal for domestic use was imported. Coal was used primarily in the iron and metal processing industries and these industries require a year-round supply, which could not be guaranteed from Spitsbergen owing to pack ice blocking the sea export route for most of the year (Sourcewatch, 2007).

Natural Gas.—Natural gas production commenced in late 2007 from StatoilHydro ASA's Ormen Lange field on the Norwegian continental shelf. Completion of this development would make Norway the world's second ranked exporter of natural gas after Russia. Maximum daily exports from Ormen Lange were projected to be 70 million cubic meters of natural gas and 50,000 barrels of condensate. The gas would be piped to the United Kingdom through the Langeled pipeline, which, along with Vesterled, was the second direct export pipeline to the United Kingdom from the Norwegian continental shelf. When Ormen Lange reaches plateau production in 2010, gas exports from Norway could increase to 120 billion cubic meters, which would be sufficient to meet 20% of the EU's gas requirements. After Troll, Ormen Lange was the largest gasfield on the Norwegian continental shelf (Rigzone.com, 2007).

Construction of the $1.16 billion Scandinavian Skanled natural gas pipeline was scheduled to start in October 2009, and the pipeline was expected to begin transmitting gas from Norwegian gasfields in mid-2011. The gas would flow to Sweden and Denmark. Once the Baltic pipeline is completed, gas would be piped from the Denmark terminal to Poland. The Baltic pipeline was scheduled to be completed in 2009 (Platts, 2007).

Petroleum.—The Government reported that a total of 31 exploration wells had been spudded in 2007 compared with 26 exploration wells spudded in 2006. The explanation was that there was better access to exploration drilling rigs in 2007. Of the total of 31 exploration wells, 20 were wildcat wells and 11 were appraisal wells. The Government expected this higher level of activity to continue because the accessibility to exploration rigs was starting to improve; however, in 2007, there was no additional available rig capacity. Most of the rigs were under contract through 2009, but construction of new rigs was expected to improve rig access considerably compared with previous years. Beginning in 2008, most of the rigs that go to the Norwegian shelf will operate under long-term contracts. The country's petroleum production capacity was about 3 million barrels per day. Norway was the world's third ranked petroleum exporter after Saudi Arabia and Russia and the seventh ranked natural gas exporter (Norwegian Petroleum Directorate, 2007).

Det Norske Oijeselskap ASA (NOIL) and Pertra ASA (Pertra) announced the merger of the two companies to form NOIL Energy ASA, which would be the second ranked operator after StatoilHydro. The merger was part of the two companies' strategy to establish a mid-cap operating company. NOIL Energy would operate 17 licenses offshore Norway and expected to operate 20 exploration wells during the next 3 years (Nortrade, 2007).

StatoilHydro announced that it had begun a 2-year drilling program in Arctic waters to determine the potential of Norway's share of one of the world's few remaining unexplored petroleum prospects. StatoilHydro also hoped to cooperate with Russian companies to find petroleum and natural gas further into the Arctic. StatoilHydro stated that it would like the Government to work with Russia on the future development of Arctic resources. StatoilHydro was chosen by Gazprom of Russia to be one of the foreign partners to develop the massive Shtokman natural gas field off Russia's north coast (AFX News Ltd., 2007).

The Norwegian Oil Directorate confirmed a StatoilHydro oil strike in the Barents Sea, 65 kilometers (km) north of Honningsvaag. The find may be larger than the Goliath Field. The new Nucula field could contain as much as 300 million to 350 million barrels of oil compared with the estimated 250 million barrels of the Goliath. The two fields are located 45 km apart. The Nucula test well was drilled to a depth of 1,692 meters (Alexander's Gas & Oil Connections, 2007a).

The Norwegian Petroleum Directorate stated that Norway needed to open up new offshore areas and step up the search in existing areas if it is to remain a key oil exporter. Oil production was declining by about 4% per year since it had peaked in 2000. The Government was also pushing the search for new supplies north in Arctic waters (Alexander's Gas & Oil Connections, 2007b).

Outlook

Norway will continue to obtain nearly all its electricity from hydropower. Norway's economy is expected to remain highly dependant upon the country's hydrocarbon resources, and the Government is expected to continue to manage them. The Government is likely to continue exploration in the Barents Sea, which it considers to be a potential source for new oil production and which has the potential to host large quantities of oil reserves. Industrial minerals will continue to be important to the economy.

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TABLE 1
NORWAY: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
METALS						
Aluminum:						
Primary	metric tons	1,192,400	1,321,700	1,376,500	1,422,000	1,304,400 [2]
Secondary	do.	256,800	348,700	362,400	349,200	350,000
Cadmium, smelter	do.	331	260	200	150 [r]	150
Cobalt:						
Metal, refined	do.	4,556	4,670	5,021	4,927	3,939 [2]
Copper, metal, refined, primary and secondary	do.	35,900	35,600	38,500	39,700	34,212 [2]
Iron and steel:						
Iron ore and concentrate, Fe content		340	408	420	620 [r]	630 [2]
Metal:						
Pig iron[e]		90	100 [r]	100 [r]	100	100
Ferroalloys:[e]						
Ferromanganese		245	245	130	130	130
Ferrosilicomanganese		230	260	290	250	250
Ferrosilicon, 75% basis		350	300	165	93 [r]	90
Silicon metal		100	194	176	150	150
Other		15	15	60	60	60
Total		940	1,010	820	680	680
Steel, crude		698	695	701	679	740
Semimanufactures, rolled[e]		635	640	650	600	650
Nickel:						
Mine output:						
Concentrate[e]	metric tons	--	--	130 [r]	400 [r]	300
Ni content	do.	169	181	100 [r]	362 [r]	240 [2]
Metal, primary	do.	77,200	71,400	84,900	82,000	87,600
Titanium:[e]						
Ilmenite concentrate		840 [2]	860	860	850	882 [2]
TiO_2 content		378 [2]	387	388	385	397
Zinc, metal, primary	metric tons	143,627	140,900	151,285	160,700	157,000
INDUSTRIAL MINERALS						
Cement, hydraulic[e]		1,860	1,870	1,900	1,850	1,800
Feldspar[e]	metric tons	74,000	75,000	88,690 [2]	65,000 [r, 2]	65,000 [2]
Graphite[e]	do.	2,400	2,300	8,893 [2]	9,000 [2]	3,000 [2]
Lime, hydrated, quicklime[e]		100	100	100	100	100
Mica, flake[e]	metric tons	2,600	2,600	2,700	2,700	1,000
Nepheline, syenite[e]		300	300	300	312 [r, 2]	312
Nitrogen, N content of ammonia		354	420	300	350	350
Olivine sand[e]		3,100	3,100	3,100	3,000	3,000
Stone, crushed:[e]						
Dolomite		850	850	513 [2]	525	525
Limestone		7,200	7,300	7,200	7,200	7,200
Quartz and quartzite		1,500	1,500	909 [2]	1,000	1,000
Sulfur, byproduct:						
Metallurgical		100	85	80	80	80
Petroleum[e]		20	18	20	20	20
Total[e]		120	103	100	100	100
Talc, soapstone, steatite[e]		28	28	26 [r]	27	28
MINERAL FUELS AND RELATED MATERIALS						
Coal, all grades[e]		300	300	300	236 [r, 2]	322 [2]
Gas, natural, marketed[3]	million cubic meters	73,124	78,465	84,964	96,000	130,800 [2]
Peat, for agricultural use[e]	do.	30	30	30	30	30

See footnotes at end of table.

TABLE 1—Continued
NORWAY: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
MINERAL FUELS AND RELATED MATERIALS—Continued						
Petroleum:						
Crude[4]	thousand 42-gallon barrels	1,041,400	1,024,400	964,290	965,000 [r]	965,000
Natural gas liquids[e]	do.	42,000	52,695 [2]	60,879 [2]	60,000	60,000
Refinery products:[e]						
Naphtha	do.	27,000	8,741 [2]	10,017 [2]	10,000	10,000
Gasoline	do.	27,000	23,913 [2]	28,078 [2]	28,000	28,000
Kerosene	do.	9,000	4,774 [2]	5,771 [2]	5,800	5,800
Distillate fuel oil	do.	47,000	45,765 [2]	50,121 [2]	50,000	50,000
Residual fuel oil	do.	12,000	13,823 [2]	11,806 [2]	12,000	12,000
Other products	do.	5,000	3,351 [2]	4,194 [2]	4,000	4,000
Refinery fuel and losses	do.	5,000	2,757 [2]	2,977 [2]	3,000	3,000
Total	do.	132,000	103,124 [2]	112,964 [2]	113,000	113,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. do. Ditto. -- Zero.

[1]Table includes data available through November 30, 2008.

[2]Reported figure.

[3]Reported as total methane sales.

[4]Excluding natural gas liquids.

TABLE 2
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum		Hydro Aluminium ANS (Norsk Hydro A/S, 70%)	Smelters at Ardal, Hoyanger, Karmoy, and Sunndal	600
Do.		do.	Plant at Holmestrand	90
Do.		Elkem Aluminium ANS (Elkem A/S, 50%, and Alcoa Inc., 50%)	Smelters at Farsund and Mosjoen	250
Do.		Sor-Norge Aluminium A/S (Alusuisse Group, 50%, and Hydro Aluminium ANS, 49%)	Smelter at Odda	50
Cadmium		Norzink A/S (Outokumpu Oyj, 100%)	Smelter at Eitrheimsneset	0.3
Cement		Norcem A/S	Plants at Brevik and Kjopsvik	2,150
Coal		Store Norske Spitsbergen Grubekompani AS	Mines at Longyearbyen and Svea	450
Cobalt		Nikkelverk A/S (Falconbridge Nickel Mines Ltd., 100%)	Smelter at Kristiansand	5
Copper:				
Ore, Cu content		Nikkel og Olivin A/S (Outokumpu Oyj, 100%)	Mine at Narvik	1
Metal		Nikkelverk A/S (Falconbridge Nickel Ltd., 100%)	Smelter at Kristiansand	40
Dolomite		Franzefoss Bruk A/S	Mine at Ballagen	350
Do.		Norwegian Holding A/S	Mines at Hammerfall, Logavlen, and Kvitblikk	500
Feldspar		Franzefoss Bruk A/S	Mine at Lillesand	100
Ferroalloys		Elkem Salten (Elkem A/S, 100%)	Ferrosilicon plant at Straumen	90
Do.		Elkem Bjolvefossen (Elkem A/S, 100%)	Ferrosilicon plant at Alvik	60
Do.		Elkem Thamshavn (Elkem A/S, 100%)	Ferrosilicon plant at Orkanger	60
Do.		Finnfjord Smelteverk A/S, Rana Metal (FESIL ASA, 100%)	Ferrosilicon plant at Mo i Rana	110
Do.		A/S Hafslung Metal (FESIL ASA,100%)	Ferrosilicon plant at Sarpsborg	75
Do.		Ila og Lilleby Smelteverk (FESIL ASA, 100%)	Ferrosilicon plant at Finnsnes	20
Do.		Oye Smelteverk (Tinfos Jernverk A/S, 100%)	Silicomanganese plant at Kvinesdal	235
Iron, metal		Ulstein Jernstoperi A/S	Hordvikneset	10
Iron ore		Rana Gruber A/S (Norsk Jernverk Holding A/S, 100%)	Mine at Mo i Rana	2,000
Do.		Arctic Bulk Minerals A/S	Mine and plant at Kirkenes	1,500
Lime		Hylla Kalkverk (Nikolai Bruch A/S, 100%)	Verdal/Trondheim Mine and plant	80
Do.		A/S Norsk Jernverk	Plant at Mo i Rana	48
Do.		Ardal og Sunndal Verk A/S	More og Romsdal Mine at Surnadal	20
Do.		Breivik Kalkverk A/S	Alesund Mine at Larsnes	20
Do.		Mjoendalen Kalkfabrik	Plant at Asen/Drammen	7
Limestone		Norcem A/S	Dalen, Bjorntvedt, and Kjopsvik Mines	1,600
Do.		Vardelskalk A/S (Franzefoss Burk A/S, 100%)	Sandvika Mine	800
Do.		Breivik Kalkverk A/S	Visnes and Glaerum Mines	500
Magnesium		Norsk Hydro A/S (Government, 51%)	Plants at Porsgrunn and Sauda	50
Manganese, alloys		Eramet SA	do.	500
Natural gas	million cubic meters	StatoilHydro ASA	Gama, Gullfaks, Sleipner Ost, and Statfjord Fields	12,270
Do.	do.	Phillips Petroleum Company Norway	Ekofisk Field	9,900
Do.	do.	Elf Petroleum Norge A/S	Frigg, Heimdal, and Ost-Frigg Fields	5,750
Do.	do.	Norsk Hydro Produksjon A/S	Troll-Oseberg Field	2,600
Do.	do.	StatoilHydro ASA	Mikkel Field	2,100
Do.	do.	Total SA, 40%; Petoro AS, 30%; Marathon Petroleum Norge AS, 20%; Norsk Hydro Produksjon A/S, 10%	Skirne Field	1,550
Do.	do.	BP Petroleum Development of Norway	Gyda and Ula Fields	1,040
Do.	do.	Esso Norge A/S	Odin Field	1,000
Do.	do.	Amoco Norway A/S	Hod and Valhall Fields	910
Nepheline syenite		North Cape Mineral A/S (Unimin Corp., 84%)	Mine at Stjernoy	350
Nickel:				
Ore, Ni content		Nikkel og Olivin A/S (Outokumpu Oyj, 100%)	Mine at Narvik	3
Do.		Titania A/S (Kronos Norge A/S, 100%)	Mine at Tellnes	0.5
Metal		Nikkelverk A/S (Falconbridge Nickel Mines Ltd., 100%)	Smelter at Kristiansand	85
Olivine		A/S Olivin	Aheim Mine and plant	2,500
Do.		do.	Stranda Mine and plant	300
Do.		Franzefoss Bruk A/S	Lefdal Mine at Bryggja	500

See footnote at end of table.

TABLE 2—Continued
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Petroleum	42-gallon barrels per day	StatoilHydro ASA	Gullfaks, Statfjord, Tommeliten, and Veslefrikk Fields	1,069,300
Do.	do.	Norsk Hydro Produksjon A/S	Brage, Mime, and Oseberg Fields	566,200
Do.	do.	Phillips Petroleum Company Norway	Ekofisk Field	237,500
Do.	do.	Saga Petroleum A/S	Snorre Field	170,000
Do.	do.	BP Petroleum Development of Norway	Gyda and Ula Fields	155,000
Do.	do.	A/S Norske Shell	Draugen Field	90,000
Do.	do.	ExxonMobil Refining & Supply Co.	Slagen Refinery	110,000
Do.	do.	Statoil Mongstad	Mongstad Refinery	200,000
Pyrite		Folldal Verk A/S (Norsulfid A/S, 100%)	Mine at Hjerkinn	10
Quartzite		Elkem Tana (Elkem A/S, 100%)	Mine at Tana	540
Do.		Elkem Marnes (Elkem A/S, 100%)	Mine at Sandhornoy	200
Do.		Vatnet Kvarts A/S	Mine at Nordland	150
Do.		Snekkevik Kvartsbrudd	Mine at Kragero	110
Silicon metal		Lilleby Metall A/S (FESIL ASA, 100%)	Plant at Trondheim	9
Do.		FESIL ASA	Plant at Holla	50
Steel		Fundia AB (Norsk Jenverk, 50%, and Rautaruukki Group, 50%)	Plants at Christiania, Mandal Stal, Mo i Rana, and Spigerverk	600
Talc		A/S Norwegian Talc (Pluess-Staufer AG, 51%)	Mine and plant at Altermark/Knarrevik and Framfjord	90
Do.		Kvam Minerals A/S	Mine and plant at Kvam	6
Titanium, concentrate		Titania A/S (Kronos Norge A/S, 100%)	Mine at Tellnes	800
Zinc, metal		Norzik A/S (Outokumpu Oyj, 100%)	Smelter at Odda	150

Do., do. Ditto.

THE MINERAL INDUSTRY OF POLAND

By Mark Brininstool

Poland has significant mineral reserves of several mineral products and also has important mineral processing facilities. In 2007, Poland had about 6% of world reserves of copper content in ore, about 19% of world reserves of silver content in ore, and significant coal reserves. In terms of world rankings, Poland was the 6th ranked mine producer of silver, the 10th ranked mine producer of copper, and an important producer of feldspar, gypsum, lead, lime, nitrogen, salt, sand and gravel, and sulfur (Brooks, 2008; Dolley, 2008; Edelstein, 2008; Kostick, 2008; Kramer, 2008; Miller, 2008; Ober, 2008; Olson, 2008; Potter, 2008; Smith, 2008).

Minerals in the National Economy

In 2007, Poland's real gross domestic product (GDP) increased by 6.6% compared with that of 2006, and inflation increased by 2.5% (International Monetary Fund, 2008, p. 70). Industrial production contributed about 20% of the total GDP; mining and quarrying made up about 10% of the value of industrial output and 2% of the GDP (Dmochowska, 2008a, p. 462).

Mineral Trade

According to the Central Statistical Office's Yearbook of Foreign Trade Statistics 2008, Poland's total imports in 2007 were valued at 456,828 million Polish zlotys (Zl) ($165,117 million[1]), of which the two categories base metals and articles thereof and mineral products accounted for Zl107,553 million ($38,874 million), or 24%. Exports in 2007 were valued at Zl386,556 million ($139,717 million), of which base metals and articles thereof and mineral products accounted for Zl67,202 million ($24,290 million), or 17% (Dmochowska, 2008b, p. 81-93). In terms of value, crude oil and natural gas were Poland's leading mineral imports, and coal, copper, iron and steel, and silver were its leading mineral exports. Although Poland was a significant producer of mineral products, it was dependent on imports of aluminum, iron ores and concentrates, and mineral fuels, which resulted in a negative trade balance for mineral products (Ney and Smakowski, 2008, p. xix-xx).

Government Policies and Programs

Mining activities in Poland are regulated by the Act of 4 February, 1994 on the Geological and Mining Law (the Act). Enforcement of the regulations in the Act is generally carried out by the Department of Geology and Geological Concessions within the Ministry of Environment (Department of Geology and Geological Concessions, 2009). The trade, distribution, and storage of gaseous fuels are additionally regulated by the Act on Reserves of Crude Oil, Petroleum Products and Natural Gas dated February 16, 2007, and the Polish Energy Law of April 10, 1997 (Polskie Gornictwo Naftowe i Gazownictwo Warszawa, 2008, p. 30).

Production

In 2007, Poland was a significant world producer of coal, copper content in ore, feldspar, gypsum, lead content in ore, lime, nitrogen, salt, sand and gravel, silver content in ore, and sulfur (Brooks, 2008; Dolley, 2008; Edelstein, 2008; Kostick, 2008; Kramer, 2008; Miller, 2008; Ober, 2008; Olson, 2008; Potter, 2008; Smith, 2008). Of these minerals, copper ore and refined copper were the most significant mineral products for Poland in terms of production and export revenue; copper and articles thereof earned Zl9,330 million ($3,372 million) worth of export revenues in 2007, which was second only to iron and steel export revenue of Zl17,364 million ($6,276 million) within the category of base metals (Dmochowska, 2008b, p. 93). Poland was also the sixth ranked producer of silver content in ore in the world and had maintained average production levels of between 1,200 and 1,400 metric tons (t) for the past 5 years (Brooks, 2008). Production of major industrial minerals, including feldspar, gypsum, lime, sand and gravel, and sulfur increased, whereas output of nitrogen and salt decreased.

Structure of the Mineral Industry

The vast majority of companies in the Polish mineral industry were privately owned, and foreign companies were allowed to operate and have full ownership of companies registered as joint-stock or limited-liability companies (Ney and Smakowski, 2007, p. ix). In 2007, 2,424 entities that were classified as mining and quarrying companies were operating. Of these 2,424 companies, only 4 were listed as state-owned enterprises, which was down from 12 in 2006, and 228 entities had foreign capital participation (Dmochowska, 2008a, p. 483). Table 2 is a list of the major mineral industry facilities in Poland, and table 3 provides information on the major mineral resources in Poland.

Commodity Review

Metals

Bauxite and Alumina and Aluminum.—Poland has no bauxite deposits and all alumina for aluminum production is imported into the country. In 2006 (the latest year for which trade data were available), Poland imported 65,100 t of bauxite and 155,700 t of alumina. Bauxite imports were used in the cement, chemical, and steel industries. No imported bauxite was used to produce alumina. Bosnia and Herzegovina (47,700 t), Ireland (40,300 t), and Germany (31,700 t) were the main sources of Polish alumina imports. The Konin-Impexmetal aluminum smelter at Konin used about 66% of the alumina imports in the production of primary aluminum; the remaining

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[1] Where necessary, values have been converted from Polish zlotys (Zl) to U.S. dollars (US$) at the rate of Zl2.76671= US$1.00.

34% of imports was used to produce aluminous cement, chemicals, electroceramics, glass, and high-alumina refractory materials (Ney and Smakowski, 2008, p. 46-49).

Aluminum production increased only slightly from 2006 to 2007 (by 2.9%), whereas imports of aluminum increased by 34% (Ney and Smakowski, 2008, p. 21). Imports of the more-inclusive category of aluminum and articles thereof increased by about 25% from 2005 to 2006 (the latest year for which data were available), and exports increased by about 17% (tables 4 and 5).

Copper.—Poland had 14 copper deposits located in Lower Silesia; combined, these deposits contained about 1,961 million metric tons (Mt) of copper ore and about 38 Mt of copper (table 3). The copper industry in Poland was dominated by KGHM Polska Miedz S.A. (KGHM), which was the only copper mining and primary copper producing firm in Poland. A few other small firms had the capacity to process copper scrap and copper-containing wastes. In 2007, copper ore production decreased by about 3% compared with production in 2006, and the copper content of concentrate decreased by about 9%. Total primary and secondary smelter copper production decreased by about 5% in 2007 compared with that of 2006. Production of electrolytically refined copper decreased by about 4% (table 1). The decreased production of ore was reportedly a result of KGHM ceasing production on days "legally free from work" in response to a request of the National Labor Inspectorate (KGHM Polska Miedz S.A., 2008a, p. 55). KGHM was enacting changes in its labor system that would allow the mines to increase their operating time without violating National Labor Inspectorate regulations; it was also continuing its efforts to increase exploitation of the Glogow Gleboki-Przemyslowy deposit to increase ore production. KGHM's copper content of extracted ores decreased to 1.67% in 2007 from 1.79% in 2006 because mining operations were being conducted in areas with lower copper content of ore than had been mined in 2006. These decreases in ore production and in copper content resulted in reduced copper content of ore production. KGHM's copper content of concentrate decreased to 24.1% in 2007 from 25.6% in 2006 (KGHM Polska Miedz S.A., 2008a, p. 40, 55).

In 2006 (the latest year for which data were available), exports of Polish refined copper and copper alloys decreased by about 1%. Germany, France, China, and Austria (in order of the quantity of imports) remained the leading importers of refined copper from Poland (table 5; Ney and Smakowski, 2008, p. 137).

KGHM operated three mines in Poland (the Lubin, the Polkowice-Sieroszowice, and the Rudna Mines), which, combined, had deposits that covered an area of 467 square kilometers and that contained about 80.5% of the country's copper reserves. The Rudna Mine, which was the leading producer of ore, produced about 12.4 Mt in 2007. The company also had ore enrichment plants located in Lubin, Polkowice, and Rudna, and smelting and refining facilities located in Glogow and Legnica (KGHM Polska Miedz S.A., 2008b; Ney and Smakowski, 2008, p. 131).

KGHM reported record sales of Zl12.2 billion ($4.4 billion) and record profits of Zl3.8 billion ($1.4 billion) in 2007, partly owing to higher copper prices. In a continuing effort to expand its copper resource base, KGHM acquired permission for exploratory drilling in eastern Germany (KGHM Polska Miedz S.A., 2008a, p. 5, 10).

Gold.—Gold production in Poland was entirely a result of gold obtained from the processing of copper ores and was therefore controlled by Poland's sole copper producer, KGHM. In 2007, gold output was cut in half, returning to the normal production figures the industry had experienced before the exceptional output seen in 2006 (table 1). The more than doubling of gold production in 2006 was owing to the purchase of high-gold-content copper-bearing materials for processing in 2006 (KGHM Polska Miedz S.A., 2008a, p. 56). All gold was produced at KGHM's Precious Metals Plant at the Glogow smelter and refinery. Copper ores processed there were estimated to contain less than 1 gram per metric ton (g/t) of gold. Polish gold reserves were estimated to total about 50 t (Ney and Smakowski, 2008, p. 205-06).

Iron and Steel.—Despite having no known deposits of iron ore, Poland was a significant producer of pig iron and steel. In 2006 (the latest year for which data were available), the Polish pig iron and steel industries depended on imports of about 8.6 Mt of iron ore from (in order of the quantity of iron ore imported) Russia, Ukraine, Brazil, Bosnia and Herzegovina, and other countries (Ney and Smakowski, 2008, p. 244).

In 2007, output of pig iron for steel production increased by 9% compared with production in 2006; no pig iron was produced for foundry use. Two production facilities operated by ArcelorMittal Poland S.A.—the Katowice and Sendzimir Steelworks—produced virtually all pig iron in Poland; the remaining need was supplied through imports of about 8.7 Mt (Dmochowska, 2008b, p. 177; Ney and Smakowski, 2008, p. 245).

Total crude steel production increased by about 6% compared with that of 2006. ArcelorMittal Poland's steelworks at Dobrow Gornicza and Krakow accounted for 65% of all crude steel production in Poland in 2006 (the latest year for which data were available), and the remaining 35% came from a number of smaller production facilities (Ney and Smakowski, 2008, p. 248-49).

The previous 3 years had seen a trend of increasing output in hot-rolled semimanufactures, crude steel, and pig iron mainly owing to investments in production facilities made by ArcelorMittal Poland. In 2007, the company made capital expenditures of $1.7 billion in Poland by building a hot-strip mill with a capacity of 450,000 t of semimanufactures in Krakow and a new continuous caster in Dabrowa Gornicza, and investing in other plants. ArcelorMittal also completed its purchase of ArcelorMittal Poland by acquiring the remaining 25% of its outstanding shares from the Polish Government (ArcelorMittal, 2008, p. 38, 89).

Lead and Zinc.—Lead and zinc mine output in Poland had shown a declining tendency in recent years as deposits were being depleted and the lead content in copper ores decreased. The three lead-zinc mines that had been operating in Poland were expected to close by 2013, but mining was likely to commence at new mines owing to expected new reserve developments (Ney and Smakowski, 2008, p. 268). In 2007, the total mine output of lead and zinc in ore decreased by about 1% and 4%, respectively, whereas the output of lead content of concentrate increased by about 2% and zinc concentrate output decreased by about 2%. Total refined metal production increased by about 42% for lead and 6% for zinc in 2007 compared with production in 2006. The increase in refined lead production came entirely from secondary production, which increased by 73%; primary production decreased by 13% (table 1). KGHM began lead processing at its Legnica smelter, which produced 15,228 t of refined lead in 2007 (KGHM Polska Miedz S.A., 2008a, p. 56).

Silver.—KGHM was Poland's dominant silver producer and an important producer of silver in the world market. KGHM produced 1,215 t of silver from copper ore in 2007, which was about 6% of total world silver production; this level of production made KGHM the third ranked silver producing company in the world (KGHM Polska Miedz S.A., 2008a, p. 56). Other small producers were estimated to have produced a combined total of 45 t. Silver exports decreased by 1.5% in 2007 compared with those of 2006.

Industrial Minerals

In 2007, production of most industrial minerals in Poland increased, with output of barite, bentonite, cement, dolomite, gypsum and anhydrite, and lime each increasing by more than 10%. Production of rock salt decreased by about 48%, and production of marketable quartz and quartz crystal decreased by about 14%. Data on the production of industrial minerals in Poland are in table 1.

Mineral Fuels

Coal.—Production of bituminous coal decreased by about 7% in 2007 compared with production in 2006. This decrease continued a trend of reduced coal production that was mainly a result of mine closures owing to depleted reserves and difficult mining conditions. Further development of reserves was not likely as future development projects would face difficult mining conditions, environmental concerns, and lower-quality coal in undeveloped reserves (Ney and Smakowski, 2008, p. 225-26). Exports of anthracite and bituminous coal decreased from 2005 to 2006 (the latest year for which data were available) by about 14%, whereas imports of coal increased by 56% (tables 4 and 5).

Natural Gas and Petroleum.—In 2007, Poland produced 5,652 million cubic meters of natural gas and 721,000 t (5 million barrels[2]) of crude oil, but was dependent on imports from Russia for the majority of its supplies. Poland imported 10,354 million cubic meters of natural gas in 2006 (the latest year for which data were available) and 19,813,000 t (147 million barrels) of crude oil. Of these imports, about 94% of crude oil and 66% of natural gas came from Russia.

Oil and gas exploration and production in Poland were dominated by Polskie Gornictwo Naftowe i Gazownictwo S.A. Warszawa (PGNiG), which was 84.75% owned by the State Treasury of Poland. In 2007, PGNiG reported total production of 4.3 billion cubic meters of natural gas and 518,000 t (3,842 thousand barrels) of crude oil with reserves of 98 billion cubic meters of natural gas and 21.2 Mt (157 million barrels) of oil. PGNiG also expanded potential overseas operations by signing a memorandum of understanding with India's Gujart State Petroleum Co. for exploration and production of oil and gas in Egypt, India, and Yemen, obtaining the rights for exploration and production work in Libya, and acquiring partial ownership of projects in Denmark and on the Norwegian continental shelf (Polskie Gornictwo Naftowe i Gazownictwo Warszawa, 2008, p. 34-35, 38-40).

FX Energy, Inc. increased its gas reserves in Poland by 87% in 2007 owing to new gas discoveries at its Roszkow-1 and Winna Gora-1 wells. Gross proved reserves at the two locations are 1,036 million cubic meters, and FX Energy was granted 506 million cubic meters of those reserves based on its partnership arrangement with PGNiG (Rigzone.com, 2007).

Outlook

Poland's mineral industry has had new investments, mainly in the copper, iron and steel, and natural gas industries, but continues to face the challenge of depleted ore deposits and lower ore grades. Important industries, such as copper, iron and steel, and natural gas, will likely be able to increase production slightly, whereas lead and zinc and coal production will most likely continue to fall in coming years. Poland's dependence on imports of such minerals as iron ore and concentrate, natural gas, and oil will likely continue into the foreseeable future.

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[2] Where necessary, values have been converted from metric tons (t) of crude oil to barrels (bbl) of crude oil at the rate of 1 t=7.418 bbl.

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TABLE 1
POLAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
METALS						
Aluminum, metal:						
Primary	metric tons	45,371	45,807	54,508	57,620	58,736
Secondary[e, 3]	do.	11,900	13,100 [r]	11,800 [r]	18,900 [r]	20,000
Total[e]	do.	57,300	58,900 [r]	66,300 [r]	76,500 [r]	78,700
Cadmium, metal, primary	do.	375	356	408	373 [r]	421
Copper:						
Ore:						
Gross weight		29,992	31,800	30,434 [r]	31,279 [r]	30,262
Cu content	metric tons	570,000 [e]	590,000	575,203 [r]	559,894 [r]	505,900
Concentrate:						
Gross weight		1,756	2,054	1,977	1,946 [r]	1,876
Cu content	metric tons	505,000 [r]	531,000 [r]	512,000 [r]	497,000 [r]	452,000
Metal:						
Smelter:						
Primary	do.	560,000 [r, e]	547,200 [r]	555,700 [r]	555,900 [r]	519,000 [p]
Secondary	do.	24,100 [r, e]	33,300 [r]	28,200 [r]	33,500 [r]	40,000 [p]
Total	do.	584,100 [r]	580,500 [r]	583,900 [r]	589,400 [r]	559,000 [p]
Refined, electrolytically, primary and secondary	do.	529,616	550,066	560,256	556,625	532,975
Gold, mine output, Au content	kilograms	356	527	713 [r]	1,700 [r]	883
Iron and steel:						
Pig iron:						
For foundry use		47 [r]	108 [r]	18 [r]	21	--
For steel production		5,585 [r]	6,292 [r]	4,458 [r]	5,311 [r]	5,804
Total		5,632	6,400	4,476 [r]	5,332 [r]	5,804
Ferroalloys:						
Blast furnace, ferromanganese	metric tons	1,000	46,900	7,800 [r]	4,100 [r]	4,000 [e]
Electric furnace:						
Ferrochromium	do.	200	--	--	400 [r]	400 [e]
Ferrosilicomanganese	do.	5,000	29,600	10,242 [r]	3,310 [r]	3,000 [e]
Ferrosilicon	do.	92,700 [e]	83,600 [r]	65,118 [r]	13,034 [r]	58,538
Total ferroalloys	do.	98,900 [e]	160,100 [r]	83,160 [r]	20,844 [r]	65,938
Steel, crude:						
From oxygen converters		6,070	6,865	4,893 [r]	5,766 [r]	6,188
From electric furnaces		3,040	3,713	3,443 [r]	4,225 [r]	4,433
Total		9,110	10,578	8,336	9,991 [r]	10,621
Semimanufactures:						
Hot rolled		6,720	7,605	6,294	7,666	8,011
Cold rolled		1,533	1,600	1,600	1,600	1,482
Pipe		309	310	380	417	401
Lead:						
Mine output:						
Pb content of Pb-Zn ore	metric tons	74,000	72,900 [r]	68,500 [r]	67,100 [r]	66,300 [e]
Pb content of Cu ore	do.	36,000	37,000 [r]	31,200 [r]	30,500 [r]	30,120
Total	do.	110,000	109,900 [r]	99,700 [r]	97,600 [r]	96,420
Concentrate:						
Gross weight	do.	100,200	110,200	115,800 [r]	93,700 [r]	96,400
Pb content	do.	54,700	60,200	75,100 [r]	58,500 [r]	59,900
Metal, refined, primary and secondary:						
Primary	do.	32,100	31,600	29,500	26,200	22,800
Secondary	do.	42,000	42,300	51,500	46,800	81,000
Total	do.	74,100 [r]	73,900 [r]	81,000 [r]	73,000 [r]	103,800

See footnotes at end of table.

TABLE 1--Continued
POLAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
METALS—Continued						
Platinum-group metals, average content of slimes:[e, 3, 4]						
Palladium	kilograms	10	10	10	10	10
Platinum	do.	20	20	20	20	20
Selenium	metric tons	78	83	82 [r]	87 [r]	85 [e]
Silver, mine output, Ag content	do.	1,295 [r]	1,419 [r]	1,293 [r]	1,270 [r]	1,250 [e]
Zinc:						
Zn content:						
Mine output	do.	174,700	163,200 [r]	156,200 [r]	144,800 [r]	139,000 [e]
Concentrate output	do.	153,900	140,300	135,600 [r]	126,600 [r]	124,000 [e]
Metal, refined, including secondary	do.	154,200	155,500 [r]	137,300	133,900 [r]	142,000
INDUSTRIAL MINERALS						
Aggregates, natural:						
Mine output	metric tons	78,945	81,398	99,966 [r]	115,451 [r]	120,000 [e]
Processed	do.	76,515 [r]	79,232 [r]	95,277 [r]	110,580 [r]	115,000 [e]
Barite, beneficiated	do.	2,900 [r]	3,183	2,357	2,143	2,500 [e]
Cement:						
Clinker		8,647 [r]	9,621 [r]	9,468 [r]	11,219 [r]	13,168
Hydraulic:						
Portland		10,692 [r]	11,573 [r]	11,584 [r]	13,618 [r]	15,663
Metallurgical cement		808	800	852	1,070	1,300 [e]
Other		153	193	210	--	--
Total		11,653	12,566 [r]	12,646	14,688	16,963
Clays and clay products, crude:						
Bentonite	metric tons	31,648	66,143	86,331	93,880	105,943
Fuller's earth	do.	4,200	4,700	5,000 [e]	5,000 [e]	5,000 [e]
Fire clay		144	137	156	187	198
Kaolin:						
Crude		170	191	159 [r]	200	210
Beneficiated		136	191	115	110	130 [e]
Diatomite	metric tons	700	800 [r]	500 [r]	600 [r]	600 [e]
Feldspar:						
Run of mine	do.	289,000	336,900	457,400 [r]	431,300 [r]	440,000 [e]
Processed, including imported material	do.	334,000	408,900	490,200 [r]	457,600 [r]	470,000 [e]
Gypsum and anhydrite:						
Natural:[5]						
Gypsum rock		1,031	971	1,048 [r]	1,172 [r]	1,380 [e]
Anhydrite		197 [r]	196 [r]	195 [r]	181 [r]	200 [e]
Total		1,228 [r]	1,167 [r]	1,243	1,353 [r]	1,581
Synthetic gypsum		1,094	1,250	1,173 [r]	1,217 [r]	1,300 [e]
Grand total		2,322 [r]	2,417 [r]	2,416 [r]	2,570 [r]	2,881
Lime, hydrated and quicklime		1,955	1,950 [r]	1,749 [r]	1,936 [r]	2,143
Magnesite:						
Ore, crude	metric tons	30,000	52,000	57,000 [r]	63,000 [r]	65,000
Concentrate	do.	27,200	57,900	55,300 [r]	62,500 [r]	65,000
Calcined	do.	-- [r]	100	100	-- [r]	--
Nitrogen, N content of ammonia		1,912	1,985	2,079 [r]	2,007 [r]	1,995
Salt:						
Rock		848	1,099	1,123	1,130	591
Other		3,812	4,043	3,762	3,825	3,800
Total		4,660	5,142	4,885	4,955	4,391
Sand, excluding glass sand:						
Foundry sand		666	606	766 [r]	770 [r, e]	780 [e]
Filling sand		5,843	5,945	6,047 [r]	6,197 [r]	6,250 [e]
Lime-sand brick production sand	thousand cubic meters	483	540	572 [r]	685 [r]	720 [e]
Silica:						
Glass:						
Construction, flat		644	696	650	763 [r]	780 [e]
Technical		53	69	65	70	70 [e]

See footnotes at end of table.

TABLE 1—Continued

POLAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
INDUSTRIAL MINERALS—Continued						
Silica—Continued:						
Glass—Continued:						
Glass tableware		89	98	97 [r]	102 [r]	105 [e]
Packing		968	1,108	1,083 [r]	1,116 [r]	1,150 [e]
Silica ores:						
Glass sand, marketable		1,402	1,479	1,593 [r]	1,525 [r]	1,550 [e]
Quartz and quartz crystal, marketable	metric tons	32,800	37,100	15,800 [r]	13,900 [r]	12,000 [e]
Quartzite, refractory, marketable	do.	115,400	108,000	86,000 [r]	16,900 [r]	15,000 [e]
Quartz schist, marketable	do.	2,600 [r]	9,700 [r]	10,800 [r]	10,800 [r]	10,800 [e]
Sodium compounds, n.e.s.:[6]						
Carbonate (soda ash), 98%		1,050	1,167	1,189	1,177	1,192
Caustic soda (96% NaOH)		427	452	391	462	487
Stone, mine output:						
Dimension stone		2,052	2,282	3,164 [r]	3,729 [r]	4,000 [e]
Dolomite		1,815	1,986	1,834	2,013	2,232
Limestone:						
For lime production		11,379	11,623 [r]	11,233 [r]	13,645 [r]	13,500 [e]
For non-lime end use		23,747	23,233	24,607	29,299	34,044
Road stone		174 [r]	170 [r]	166 [r]	160 [r]	155 [e]
Sulfur:						
Native, Frasch		762	821	802	800	834
Byproduct:						
From natural gas		22	23	21	20	19 [e]
From oil refineries and coking plants		157	158	164	182	193 [e]
Other		3	1	1	2	2 [e]
Total		182 [r]	182 [r]	187 [r]	203 [r]	214 [e]
From gypsum[e]		10	10	-- [r]	-- [r]	--
Grand total		954 [r]	1,013 [r]	989 [r]	1,003 [r]	1,048
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		18,500	36,400	30,500 [r]	34,100 [r]	34,000 [e]
Coal:						
Bituminous		103,016	101,230	97,903	95,220	88,313
Lignite and brown		60,919	61,197	61,136	60,844	57,538
Total		163,935	162,427	159,039	156,064	145,851
Coke, coke oven		10,111	7,752	8,518	9,735	10,383
Fuel briquets, all grades		4	3	3	3	3 [e]
Gas:						
Natural	million cubic meters	5,315	5,630	5,742	5,650	5,652
Manufactured:						
Town gas	do.	4	5	11	10	10
Coke oven gas	do.	4,245	4,216	3,545	4,101	4,382
Generator gas[e]	do.	300	300	300	300	300
Total	do.	4,549	4,521	3,856	4,411 [r]	4,692
Peat, fuel and agricultural		431	509	639 [r]	577 [r]	641
Petroleum:						
Crude		765	886	849	797	721
Refinery products[e]		16,886 [6]	17,000	16,000	16,000	16,000

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [p] Preliminary. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through January 31, 2009.

[2] In addition to the commodities listed, cobalt and nickel, which are associated with copper ores, are produced in quantities that so far have not warranted further recovery.

[3] Based on official Polish estimates.

[4] Estimates based on reported platinum- and palladium-bearing final (residual) slimes and their average Pt and Pd content from electrolytic copper refining.

[5] Includes building gypsum, as well as an estimate for gypsum used in the production of cement.

[6] Not elsewhere specified.

TABLE 2
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1]

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Aluminum:			
Primary	Aluminium Konin-Impexmetal S.A.	Konin	55.
Secondary	NPA Skawina Ltd.	Skawina	20.
Do.	Grupa KETY S.A.	Kety	NA.
Do.	Zaklady Metalurgiezne "Trzebinia"	Trzebinia	NA.
Barite[2]	Przedsiebiorstvo Hondlowo Uslugowe R&S Spolka z o.o.	Boguszow, Stanislawow	3.
Cement:			
Do.	Gorazdze Cement S.A. (Zaklady Cementowo-Wapiennicze "Gorazdze")	Gorazdze	1,800 clinker, 2,400 cement.
Do.	Gorazdze Cement S.A. (Cementownia Strzelce Opolskie)	Strzelce Opolskie	1,257 clinker, 1,630 cement.
Do.	Cementownia "Ozarow" S.A.	Ozarow	2,200 clinker, 2,400 cement.
Do.	Cementownia "Chelm" S.A.	Chelm	1,440 clinker, 2,640 cement.
Do.	Kombinat Cementowo-Wapienniczy Warta S.A.	Dzialoszyn	600 clinker, 1,150 cement.
Do.	Cementownia "Malogoszcz" S.A.	Malogoszcz	1,840 clinker, 1,800 cement.
Do.	Zaklady Cementowo-Wapiennicze Nowiny S.A.	Sitkowka	785 clinker, 1,070 cement.
Do.	Kombinat Cementowo-Wapiennicze "Kujawy" S.A.	Bielawy	900 clinker, 1,000 cement.
Do.	Cementownia "Rudniki" S.A.	Rudniki	840 clinker, 1,470 cement.
Do.	Cementownia "Wierzbica" S.A.	Wierzbica	759 clinker, 1,000 cement.
Do.	Cementownia "Nowa Huta" S.A.	Krakow	290 clinker, 1,100 cement.
Do.	Cementownia "Rejowiec" S.A.	Rejowiec	600 clinker, 845 cement.
Do.	Cementownia "Odra" S.A.	Opole	433 clinker, 800 cement.
Do.	Cementownia "Warszawa"	Warszawa (Warsaw)	600 cement.
Do.	Cementownia "Groszowice" Sp. z.o.o.	Opole	304 clinker, 425 cement.
Do.	Cementownia "Wiek"	Ogrodzieniec	710 clinker, 240 cement.
Do.	Fabrika Cementu "Wysoka"	Lazy	304 clinker, 425 cement.
Coal:			
Bituminous	Includes:	Of which:	140,000.[3]
	Kompania Weglowa S.A. (KW)	Upper Silesia (17 mines)	
	Katowicki Holding Weglowy S.A.	do. (6 mines)	
	Jastrzebska Spolka Weglowa S.A.	do. (5 mines)	
	Poludniowy Koncern Weglowy S.A.	do. (2 mines)	
	KWK Budryk S.A.	do.	
	KWK Kazimierz-Juliusz Sp. z o. o.	do.	
	SILTECH Sp. z o. o.	do.	
	KWK "Bogdanka" S.A.	Lublin Coal Basin, eastern Poland	
Lignite	Includes:	Of which:	75,000.[3]
	KWK "Belchatow"	Belchatow	
	KWK "Turow"	Turow	
	KWK "Konin"	Konin	
	KWK "Adamow"	Adamow	
	KWK "Sieniawa"	Sieniawa	

See footnotes at end of table.

TABLE 2—Continued
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1]

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Coke	Includes:	Of which:	12,000.[3]
	Zaklady Koksownicze im. Powstancow Sl.	Upper Silesia	
	Zaklady Koksownicze "Przyjazn"	do.	
	Kombinat Koksochemiczny "Zabrze"	do.	
	Huta im. Sendzimira	do. (Krakow)	
	Huta "Czestochowa"	do. (Czestochowa)	
	Zaklady Koksownicze "Walbrzych"	Lower Silesia	
Copper:			
Ore, gross weight (1.2%-2.2% Cu)	KGHM Polska Miedz S.A. (KGHM)	Lubin Mine, Lubin-Glogow District	8,000.
Do.	do.	Polkowice-Sieroszowice Mine, Lubin-Glogow District	11,000.
Do.	do.	Rudna Mine, Lubin-Glogow District	13,000.
Concentrate, gross weight (25.2% -25.9% Cu)	do.	Lubin beneficiation plant, Lubin-Glogow District	500.
Do.	do.	Polkowice beneficiation plant, Lubin-Glogow District	600.
Do.	do.	Rudna beneficiation plant, Lubin-Glogow District	1,050.
Metal, refined	do.	Refineries at Glogow I, Glogow II, and Legnica	650.
Feldspar	Strzeblowskie Kopalnie Surowcow Mineralnych	Mine at Sobotka, Lower Silesia, workings at Pagorki Zachodnie and Pagorki Wschodnie	500.
Ferroalloys:			
Electric furnace (FeSiMn, FeMn, FeCr, FeSi)	Huta "Laziska" S.A.	Upper Silesia at Laziska Gome	170.
Blast furnace (FeMn)	Huta "Pokoj" S.A.	Upper Silesia, Ruda Slaska	90.
Gold kilograms	KGHM Polska Miedz S.A. (KGHM)	Refinery at Glogow "Trzebinia"	1,700.
Gypsum and anhydrite	Includes:	Of which:	1,400.[3]
	Zaklady Przemyslu Gipsowego "Dolina Nidy"	Southeastern Poland, Gacki	
	Zaklad Gipsowy "Stawiany"	Southeastern Poland, Szarbkow	
	Kopalnia Anhydrytu "Nowy Lad"	Lower Silesia, Niwnice	
	KGHM Polska Miedz S.A. (KGHM)		
Helium million cubic meters	Zaklad Odazotowania Gazu	Western Poland, Odolanow	3.
Kaolin	KSM "Surmin-Kaolin" S.A.	Lower Silesia, Nowogrodziec	50.
Lead-zinc:			
Concentrate	Zaklady Gorniczo-Hutnicze (ZGH) "Boleslaw"	Mines and concentrators at Trzebionka, Olkusz and Pomorzany, Bukowno region	60 lead, 160 zinc.
Metal:			
Pb, refined	Huta Cynku "Miasteczko Slaskie"	Refinery at Miasteczko Slaskie	60.
Do.	Huta Metali Niezelaznych "Szopienice"	Katowice	35.
Do.	KGHM Polska Miedz S.A. (KGHM)	Smelter at Legnica	16.
Zn, refined	Huta Cynku "Miasteczko Slaskie"	Imperial Smelter at Miasteczko Slaskie	60.
Do.	Zaklady Metalurgiczny "Silesia" (input from Huta "Miasteczko Slaskie")	Refinery at Katowice	85.
Do.	Zaklady Gorniczo-Hutnicze "Boleslaw"	Refinery at Boleslaw	75.
Do.	Huta Metali Niezelaznych "Szopienice"	Katowice	28.
Lime[4]	Includes:	Of which:	
	Zaklady Przemyslu Wapienniczego Trzuskawica	Kieleckie County, Swietokrzyskie Mountains	4,500.[3]
	Slaskie Zaklady Przemyslu Wapienniczego Opolwap S.A.	Opole County	
	Zaklady Przemyslu Wapienniczego Bukowa	Kieleckie County, Swietokrzyskie Mountains	
	Kombinat Cementowo-Wapienniczy Kujawy S.A.	Bydgoskie County	

See footnotes at end of table.

TABLE 2—Continued
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1]

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Lime—Continued:[4]		Includes:	Of which:	
		Zaklady Cementowo-Wapiennicze Nowiny	Kieleckie County	
		Produkcyjno-Handlowo-Uslugowe Wapmo-Sabinow	Czestochowa County	
		Wojcieszowskie Zaklady Przemyslu Wapienniczego Sp. z.o.o.	Jeleniogorskie County	
		Zaklady Przemyslu Wapienniczego w Sulejowie	Piotrkowskie County	
		Zaklad Wapienniczy w Plazie	Katowickie County	
Natural gas	million cubic meters	Polskie Gornictwo Naftowe i Gazownictwo Warszawa (84.75% of shares owned by State Treasury of Poland)	Gasfields at pre-Carpathian foothills; Carpathian Mountains Lowlands, near Ostrow Wielkopolski, Poznan, and Trzebnica, north of Wroclaw	4,900.
Do.	do.	FX Energy, Inc. (Partnership with Polskie Gornictwo Naftowe I Gazownictwo Warszawa)	Western Poland	70
Nitrogen:				
Ammonia (NH_3)		Includes:	Of which:	2,400.[3]
		Zaklady Azotowe "Pulawy" S.A.	Pulawy in eastern Poland	
		Zaklady Azotowe "Kedzierzyn" S.A.	Kedzierzyn in Upper Silesia	
		Zaklady Azotowe "Wloclawek" S.A.	Wloclawek in central Poland	
		Zaklady Azotowe S.A. w Tarnowie	Tarnow in southern Poland	
		Zaklady Azotowe S.A. w Chorzowie	Chorzow in Upper Silesia	
		Zaklady Chemiezne "Police"	Police in northwestern Poland	
Fertilizer (N)		do.	do.	1,700.
Petroleum:				
Crude		Includes:	Of which:	200.[3]
		Polskie Gornictwo Naftowe i Gazownictwo Warszawa (PGNiG)	Oilfields in northern and northwestern lowlands; sub-Carpathian region and Carpathian Mountains	
		Predsiebiorstwo Poszukiwan i	do.	
Do.		Eksploatacji Rpy i Gazu "Petrobaltic"	Baltic Sea Shelf	100.
Refined		Includes:	Of which:	13,500.[3]
		Petrochimia-Plock	Plock in central Poland	
		Rafineria "Gdansk"	Gdansk in northern Poland	
		Rafineria "Chechowice"	Czechowice in southern Poland	
		Rafineria "Trzebinia"	Trzebinia in southern Poland	
		Rafineria "Glimar" Gorilice	Gorilice in southern Poland	
		Rafineria "Jedlicze"	Jedlicze in southern Poland	
		Podkarpackie Zaklady Rafyneryjne w Jasle	Jaslo in southern Poland	
Salt, all types		Includes:	Of which:	6,500.[3]
		Inowroclawskie Kopalnie Soli S.A.	Gora, Mogilno I, and Mogilno II Mines at Inowroclaw in central Poland	
		Kopalnia Soli "Klodawa"	Klodawa in central Poland	
		Kopalnia Soli "Wieliczka"	Wieliczka in southern Poland, near Krakow, mining deposits at Barycz and Wieliczka	
		Kopalnia Soli "Bochnia"	Southern Poland, mines at the Lezkowice and Siedlec-Moszczenica-Lapczyca deposit. Not known to have operated in 1999	
		KGHM Polska Miedz S.A. (KGHM)	Sieroszowice in southwestern Poland	
		Kopalnia Wegla Kamiennego "Debiensko"	Debiensko, Upper Silesia	
		Janikowskie Zaklady Sodowe "Janikosoda" S.A.	Janikowo in central Poland	
Selenium		KGHM Polska Miedz S.A. (KGHM)	Refinery at Glogow	90.
Silver		KGHM Polska Miedz S.A. (KGHM) and Zaklady Metalurgiczne Trzebinia	Refined from dore produced by the Szopienice Pn-Zn smelter-refinery largely from KGHM-supplied slimes	1.5.[3]

See footnotes at end of table.

TABLE 2—Continued
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1]

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Steel:			
Crude and semimanufactures	Includes:	Of which:	14,000 (crude).[3]
	ArcelorMittal Poland S.A.	Steelworks at Dobrowa Gornicza (formerly Huta Katowice S.A.), producing pig iron, crude steel, hot-rolled products, and cast steel	
	do.	Steelworks at Krakow (formerly Huta Sendzimir S.A.), producing pig iron, crude steel, hot-rolled products, cold-rolled products, pipes, and cast iron	
	do.	Steelworks in Warsaw (formerly Huta "Lucchini-Warszawa" Sp. z o.o.), producing crude steel, hot-rolled products, and cold-rolled strip	
	do.	Steelworks in Swietochlowice (formerly Huta Floriana S.A.), producing crude steel, hot-rolled products, galvanized sheet, and cold-rolled strip	
	do.	Steelworks in Sosnowiec, producing hot-rolled products, cold-rolled strip, and cast iron	
	CMC Zawiercie S.A.	Steelworks at Zawiercie, producing crude steel, hot-rolled products, cast iron, and cast steel	
	ISD Huta Czestochowa S.A.	Steelworks at Czestochowa, producing pig iron, crude steel, hot-rolled sheets, pipes, and cast iron	
	Celsa "Huta Ostrowiec" S.A.	Steelworks at Ostrowiec-Swietokrzyski, producing crude steel, hot-rolled products	
	P.P. Huta "Labedy"	Steelworks at Gliwice, producing crude steel and hot-rolled products	
	Huta "Stalowa Wola" S.A.	Steelworks at Stalowa Wola, producing crude steel	
	Huta "Jednosc" S.A	Steelworks at Siemianowice Slaskie, producing crude steel, hot-rolled products, and pipes	
	Huta "Batory" S.A.	Steelworks at Chorzow, producing crude steel, hot-rolled products, and pipes	
	P.P. Huta "Baildon"	Steelworks in Katowice, producing crude steel, hot-rolled products, cold-rolled strip, and cast steel	
	Huta "Malapanew" S.A.	Steelworks at Ozimek, producing crude steel and cast steel	
	Huta "Zabrze" S.A.	Steelworks at Zabrze, producing crude steel, cast iron, and cast steel	
	Huta "Zygmunt" S.A.	Steelworks at Bytom, producing crude steel, cast iron, and crude steel	
Semimanufactures only	Huta Cedler S.A.	Steelworks in Sosnowiec, producing hot-rolled products, cold-rolled strip, and cast iron	
	P.P. Huta "Kosciuszko"	Steelworks at Chorzow, producing hot-rolled products	
	Huta "Pokoj" S.A.	Steelworks at Ruda Slaska, producing hot-rolled products	
	Walcownia Rur "Andrzej" Sp. z o. o.	Steelworks at Zawadskie, producing pipes	
	Huta "Ferrum" S.A.	Steelworks in Katowice, producing pipes	
	P.P. Huta "Bobrek"	Steelworks in Bytom, producing pig iron, hot-rolled products, and cast iron	
	Huta "Buczek" S.A.	Steelworks in Sosnowiec, producing pipes and cast iron	
	P.P. Huta "1 Maja"	Steelworks in Gliwice, producing hot-rolled products	
	Zaklad Wielkopiecowy "Szczecin" Sp. z o.o.	Steelworks at Szczecin, producing pig iron	

See footnotes at end of table.

TABLE 2—Continued
POLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1]

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Sulfur	P.P. Kopalnie i Zaklady Chemiczne Siarki "Siarkopol"	Operations at Grzybow, mining the Osiek and Grzybow-Gacki deposits	800.

Do., do. Ditto.

[1] The data presented in this table were compiled, in large measure, from information provided in the Minerals Yeabook of Poland (Bilans Gospodarki Surowcami Mineralnymi w Polsce Na Tle Gospodarki Swiatowej 2002-2006) prepared and published by the Department of Mineral and Energy Policy, Mineral and Energy Economy Research Centre of the Academy of Science of Poland, The Ministry of Environmental Protection, Natural Resources, and Forestry. Additionally, very valuable information and criticism was provided by Mr. Krystof Galos and other members of his academic department.

[2] The production of barite at the "Boguszow" Barite Mine was stopped in 1997 because of large-scale area flooding; its future status is uncertain.

[3] Annual capacity listed is total for all deposits, mines, or companies that produce the commodity.

[4] In order of size.

TABLE 3
POLAND: RESOURCES OF MAJOR MINERALS IN 2006

(Million metric tons of ore unless otherwise specified)

		Number of deposits		Geologically documented resources		
Commodity		Total	Exploited	Total	Exploited	Annual percentage change of total 2006 to 2007
METALS						
Copper ore		14	6	1,961	1,579	-1.2%
Lead and zinc		21	3	169	30	-1.2
INDUSTRIAL MINERALS						
Raw materials for chemicals:						
Sulfur, native		18	5	523	34	-0.4
Rock salt		19	5	80,722	11,735	0.7
Barite		5	--	6	--	--
Potassium-magnesium salts		5	1	669	72	--
Raw materials for construction:						
Chalk		196	54	198	20	--
Clay:						
Argillaceous material for construction ceramics		1,207	288	3,976	498	-0.3
Bentonite		8	1	2.7	0.5	--
Ceramic		29	5	142	11	-2
Refractory		17	3	55	5	-1.8
Kaolin		14	2	215	82.2	--
Dolomite		11	4	351	162	-0.6
Feldspar ore		9	2	98	11	4.3
Gypsum and anhydrite		15	5	268	136	1.1
Magnesite		6	1	15	3	15
Sand and gravel:						
Filling sand		33	9	4,516	934	--
Moulding sand		79	11	345	89	40
Quartz sand for brick and concrete		154	44	718	131	-0.1
Gravel aggregates[e]		5,383	2,079	9,246	2,260	0.6
Silica:						
Glass sand		30	8	599	218	--
Quartz, veined		7	3	7	5	--
Quartzite, refractory		19	1	14	7	-3.4
Stone:						
Stone for construction and road use		590	240	8,415	3,964	2.2
Limestone and marl for lime and cement use		178	37	18,238	6,032	0.7
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous		135	47	41,996	15,350	-3.0
Lignite		76	11	13,661	1,852	-0.5
Gas:						
Natural	billion cubic meters	258	180	143	113	-6
Coal methane	do.	51	22	95	25	10.5
Petroleum	do.	82	66	24	20	5

[e]Estimated.

-- Zero.

Sources: Central Statistical Office of Poland, 2007, Statistical Yearbook of Industry; Polish Academy of Sciences, 2008, Minerals Yearbook of Poland; Concise Statistical Yearbook of Poland.

TABLE 4
POLAND: IMPORTS OF SELECTED MINERAL COMMODITIES

(Thousand metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS						
Aluminum		74	88	85	62	83
Aluminum and articles thereof		374	354	520	551	688
Cadmium	metric tons	--	--	--	1	3
Chromite		9	11	13	9	16
Cobalt, matte, oxide, and scrap	metric tons	71	88	70	159	102
Iron ore and concentrate		6,957	8,950	10,932	6,789	8,576
Lead:						
Concentrates, Pb content		5	2	--	--	--
Refined		21 [r]	21 [r]	24 [r]	22 [r]	28
Manganese, ore and concentrate		15	10	205	40	7
Steel:						
Flat-rolled, nonalloy semimanufactures		2,357	NA	2,862	3,602	4,555
Stainless and articles thereof		91	NA	144	163	187
Pipes and hollow profiles		344	NA	415	442	516
Zinc, metal refined		8	12	20 [r]	13	29
INDUSTRIAL MINERALS						
Alumina		123	146	151	145	156
Barite		6	8	6	6	9
Bauxite		50	69	82	62	65
Bentonite		68	94	126 [r]	115 [r]	154
Cement:						
Clinker		67	70	13 [r]	34 [r]	46
Cement		654	719	543 [r]	447 [r]	289
Feldspar		168	155	201 [r]	217 [r]	222
Flourspar		6	5	7 [r]	6 [r]	8
Glass		549	534	707	759	746
Graphite, natural and synthetic		61	63	49 [r]	54 [r]	54
Gypsum and ahydrite		46	104	163 [r]	151 [r]	176
Kaolin, washed		70	72	80 [r]	83 [r]	88
Mineral fertilizers		1,609	1,875	1,999	1,648	1,495
MINERAL FUELS AND RELATED MATERIALS						
Coal, including briquets		2,768	2,560	2,335	3,372	5,271
Natural gas	million cubic meters	7,775	8,721	9,445 [r]	9,919 [r]	10,354
Petroleum:						
Crude		17,872	17,448	17,309	17,641	19,813
Refined		2,501	2,039	3,155	3,599	3,967

[r] Revised. NA Not available. -- Zero.

Sources: Central Statistical Office of Poland, Yearbook of Foreign Trade, 2003, 2005, 2006, and 2007; Polish Academy of Sciences, Minerals Yearbook of Poland, 2002-06.

TABLE 5
POLAND: EXPORTS OF SELECTED MINERAL COMMODITIES

(Thousand metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS						
Aluminum and articles thereof		264	319	332	385	451
Cadmium	metric tons	49	428	284[r]	180[r]	1
Cobalt, matte, oxide, and scrap	do.	1	--	22[r]	18[r]	4
Copper:						
Refined copper and copper alloys		288	277	276[r]	291	288
Copper manufactures		123	121	177	163	161
Lead:						
Concentrates, Pb content		58	52	54	70[r]	58
Metal, refined		21	32	21[r]	26[r]	23
Silver	metric tons	1,135	1,254	1,275[r]	1,162[r]	1,145
Steel:						
Pig iron		3	16	58[r]	5[r]	19
Steel, crude		3	3	11[r]	2[r]	19
Flat-rolled, nonalloy semimanufactures		2,151	NA	2,694	2,148	2,445
Pipes and hollow profiles		35	NA	184	188	275
Zinc:						
Concentrate, Zn content		34	35	27	39	38
Metal, refined		79[r]	66[r]	73[r]	71[r]	63
INDUSTRIAL MINERALS						
Cement		471[r]	271[r]	376[r]	510[r]	468
Glass		662	697	803	872	887
Salt		343	423	487[r]	496[r]	493
Sulfur		600	534	574[r]	592[r]	512
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Anthracite and bituminous		22,626	20,128	19,700	19,371	16,735
Lignite		42	37	27[r]	8[r]	--
Coke and semicoke	thousand metric tons	4,226	5,267	5,258	4,624[r]	6,310
Petroleum, refined		2,446	1,389	NA	NA	2,537

[r] Revised. NA Not available. -- Zero.

Sources: Central Statistical Office of Poland, Yearbook of Foreign Trade, 2003, 2005, 2006, and 2007; Polish Academy of Sciences, Minerals Yearbook of Poland, 2002-06.

THE MINERAL INDUSTRY OF PORTUGAL

By Alfredo C. Gurmendi

In 2007, Portugal was a significant European mineral producer and one of Europe's leading copper producers. It was also a significant world producer of lithium (seventh after Chile, Australia, China, Argentina, Russia, and Canada), tin (tenth after China, Indonesia, Peru, Bolivia, Brazil, Russia, Vietnam, Malaysia, and Australia) and tungsten (fifth after China, Russia, Canada, Australia, and Bolivia) (Carlin, 2008; MBendi Information Services (Pty) Ltd., 2008b; Ober, 2008; Shedd, 2008).

Portugal's Iberian Pyrite Belt (IPB) zone has several base- and precious-metal projects, which are undergoing feasibility studies. All Portuguese mineral activities are controlled by the Instituto Geologico e Mineiro (IGM). The IPB, which has 85 identified mineral deposits, was an important source of base metals in the European Union (EU) (MBendi Information Services (Pty) Ltd., 2008b).

Minerals in the National Economy

Portugal has significant mineral wealth. The most important metallic mineral resources are copper, silver, tin, tungsten, and uranium. The most important resources of industrial minerals are high-quality marble, pyrites, and rock salt. The country has limited energy resources and depended upon imports for the bulk of its energy needs (Direcção Geral de Energia e Geologia, 2008; MBendi Information Services (Pty) Ltd., 2008b, c; U.S. Energy Information Administration, 2008).

The Government continued with the country's privatization program by proceeding with legislation that would privatize many state-owned companies. Privatization was helping the country regain confidence in the Government's macroeconomic management and creating conditions that would lead to lower inflation and interest rates. The mining and mineral processing industries represented about 1% of the gross domestic product (GDP) in 2007. The mineral sector employed about 32,000, or 1% of the industrial sector's total of 3.2 million. As a target for foreign direct investment, Portugal has been overshadowed by lower-cost producers in Central Europe and Asia (Instituto Nacional de Estatística, 2008; U.S. Central Intelligence Agency, 2008).

Production

Portugal's industrial minerals sector was a modern and efficient producer of a variety of materials, most notably dimension stone and minerals for the manufacture of ceramics. The dimension stone industry continued to be an important segment of the mining industry in terms of value and trade. The country was one of the leading producers of mined copper and silver in the EU and an important producer of feldspar, salt rock, talc, and tungsten concentrates (table 1).

Structure of the Mineral Industry

In early 2007, the Canadian corporations Eurozinc Mining Corp. and Lundin Mining Corp. merged, and the new company, Lundin Mining Corp. (LMC). In Portugal, LMC acquired the Neves Corvo copper-zinc mine, the Aljustrel zinc-lead-silver mine, and the Lombador zinc project. The Aljustrel Mine entered into production on December 16, 2007. The Lombador zinc project's feasibility study was scheduled to start in 2008, and mining operations were expected to start by 2011-12. LMC was set to conduct greenfields exploration for base and precious metals near the Neves Corvo Mine (NCM), as well. Beralt Tin & Wolfram (Portugal) SARL (Beralt) mined tungsten at its Panasquiera Mine, which is located in central Portugal (Lundin Mining Corp., 2008a, b; MBendi Information Services (Pty) Ltd., 2008c, e; Resource Investor Company, 2008).

Lusosider Aços Planos S.A. and SN Servicos S.A. were the major steel producers. Cimentos de Portugal, SGPS, S.A. (Cimpor) was an important producer of cement. With the exception of copper, dimension stone, and tungsten, production of minerals and related materials had only domestic significance. Some of the leading mineral-related companies were partially owned or controlled by the Government, and some operations were privately owned (table 2).

Commodity Review

Metals

Copper and Zinc.—Production from the NCM was 90,247 metric tons (t) in concentrate in 2007 compared with 78,660 t in 2006, which was an increase of almost 15%. The country's copper output was valued at $405 million, which was 5.1% higher than that of 2006; the increase in value was a result of the increase in the price of copper to $2.91 per pound in 2007 from $2.77 per pound in 2006. NCM's current production capacity was about 2.2 million metric tons per year (Mt/yr) of mine ore output and 90,200 metric tons per year (t/yr) of copper concentrate. In 2007, zinc production supplanted tin production, as there were insufficient tin reserves remaining in the deposit to support full-time production. NCM produced 24,380 t of zinc in 2007 compared with 7,505 t in 2006 as a result of the full implementation of productivity improvement systems at the mine (table 1). The mine had estimated proven copper reserves of 6,835 million metric tons (Mt) at an average grade of 5.73%, estimated probable copper reserves of 9,975 Mt at an average grade of 5.29%, and estimated probable zinc reserves of 10,626 Mt at an average grade of 7.96% (Instituto Nacional de Estatística, 2008; Lundin Mining Corp., 2008a, c, d; MBendi Information Services (Pty) Ltd., 2008b; Resource Investor Co., 2008).

Tungsten.—Production from the Panasquiera tungsten mine in Beira Baixa Province of central Portugal was 1,067 t in concentrate (W content) in 2007 compared with 984 t in 2006, which was an increase of 8.4%. The Panasquiera Mine was operated by Beralt and continued to be one of the EU's leading producers of tungsten concentrates with a capacity to produce 1,400 t/yr of tungsten oxide (WO_3) concentrate. According to Beralt, the mine has proven and probable reserves of 1.4 Mt at a grade of 0.233% WO_3 and additional indicated (3.3 Mt at a grade of 0.263% WO_3) and inferred (1.6 Mt at a grade of 0.224% WO_3) resources. Beralt announced that development of the mine was proceeding smoothly owing to the introduction of new underground equipment and that a refurbishment program was also underway. The main end-use application for tungsten was in the manufacture of cemented carbides (60%), steel and alloy (21%), electrical and electronics products (11%), and catalysts and pigments (8%) (table 1; MBendi Information Services (Pty) Ltd., 2008c, e).

Industrial Minerals

Cement.—Portugal produced 12.6 Mt of cement in 2007 compared with 8.3 Mt in 2006, which was an increase of almost 52%. Cimpor was Portugal's leading cement producer and was the second ranked cement company on the Iberian Peninsula after Cemex España S.A. In addition to cement, Cimpor also produced aggregates, precast concrete products, and dry mortars. The development of Portugal's infrastructure was expected to create a substantial demand for Cimpor's products in the coming years (Cemex España S.A., 2008; Cimentos de Portugal, SGPS, S.A., 2008).

Stone, Dimension.—Marble was the most valuable of the stone products and accounted for the majority of stone production. The main area for marble quarrying continued to be the Evora District (Cimentos de Portugal, SGPS, S.A., 2008).

Mineral Fuels

Petroleum, Natural Gas, and Coal.—Portugal had limited domestic energy resources and imported about 90% of its energy requirements, of which about 70% was petroleum; 10%, natural gas; and 5%, coal for electricity generation. The country's leading domestic energy resource was unreliable hydropower, which depended on at least short periods of rainfall. Portugal had two oil refineries that were operated by Petróleos de Portugal (Petrogal). They were located in the Porto and the Sines terminals, and had a combined capacity of 305,000 barrels per day (bbl/d). The Government of Portugal was planning to invest $1.8 billion to upgrade the country's refining processes by 2010. Owing to Portugal's heavy dependence on imported energy, the country is emphasizing solar, wave, and wind power investment. The Government was planning to invest $10.8 billion in renewable energy projects by 2012, of which infrastructure for wind power would cost about $2.3 billion. The Government signed an agreement with Argus Resources of the United Kingdom to build a petroleum refinery that would be the largest, in terms of production, on the Iberian Peninsula. The project would be built 90 kilometers south of Lisbon at Sines. The refinery, which was to be completed by 2010, was expected to cost $4.7 billion and would have a production capacity of 250,000 bbl/d (Alexander's Gas & Oil Connections, 2008; MBendi Information Services (Pty) Ltd., 2008a, d).

Outlook

Portugal is Europe's leading producer of copper, tin, and tungsten. Some gold and base-metal projects were undergoing feasibility studies in the Portuguese zone of the IPB, which continued to be of interest to mining companies as a prime target for exploration. The IPB appears to have good potential for success on the basis of the large volcanogenic massive sulfide deposits discovered in the zone. Increased production of granite, marble, and slate in Portugal is also possible. Owing to its dependence on imported energy, the Portuguese Government plans to increase its investments in hydropower, solar power, wave power, and wind power (MBendi Information Services (Pty) Ltd., 2008c).

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TABLE 1
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
METALS						
Aluminum, secondary[e]	thousand metric tons	18	16	18	18	18
Arsenic, white[e]		25	15	15	15	15
Beryl, concentrate, gross weight[e]		5	5	5	5	5
Copper, mine output, Cu content		77,581	95,743	89,541	78,660	90,247 [2]
Iron and steel:						
Iron ore and concentrate, manganiferous:[e]						
Gross weight		14,000	14,000	14,000	14,000	14,000
Fe content		10,000	10,000	10,000	10,000	10,000
Metal:						
Pig iron[e]	thousand metric tons	100	100	100	100	100
Steel:						
Crude	do.	730	730	1,400	1,400 [e]	1,400
Hot rolled[e]	do.	1,000	1,000	800	800	800
Lead, refined, secondary[e]		4,000	4,000	3,000	3,000	3,000
Manganese, Mn content of iron ore[e]		300	300	300	300	300
Silver, mine output, Ag content	kilograms	21,800	24,400	23,786	20,076	24,167 [2]
Tin, mine output, Sn content		218	220	243	25	41 [2]
Tungsten mine output, W content		715	746	816	984 [r]	1,067 [2]
Zinc:						
Mine output, Zn content		NA	NA	NA	7,505	24,380 [2]
Metal, primary[e]		3,000	3,000	2,000	-- [r]	--
INDUSTRIAL MINERALS						
Barite		NA	NA	21	24	25 [2]
Calcium carbonate[e]		100,000	100,000	100,000	100,000	100,000
Cement, hydraulic	thousand metric tons	8,567	8,843	8,438 [r]	8,340 [r]	12,631 [2]
Clays:						
Kaolin[3]		150,000	152,077	164,072	167,792 [r]	NA
Refractory		625,000	504,017	395,820	307,512 [r]	NA
Diatomite		300	--	--	--	-- [2]
Feldspar		126,116	98,262	133,344	257,570 [r]	371,952 [2]
Gypsum and anhydrite		419,799	461,212	389,180 [r]	366,590 [r]	NA
Lime, hydrated and quicklime[e]		200,000	200,000	200,000	200,000	200,000
Lithium minerals, lepidolite		24,606	28,696	26,185	28,497	34,755 [2]
Nitrogen, N content of ammonia		244,700	243,900	244,000	244,000	244,000
Pyrite and pyrrhotite, including cuprous, gross weight[e]		10,000	10,000	8,000	8,000	8,000
Salt, rock		602,035	661,704	597,945	586,190	590,588 [2]
Sand[e]	thousand metric tons	10,000	10,000	7,336 [2]	8,757 [2]	NA
Sodium compounds, n.e.s.:[e, 4]						
Soda ash		150,000	150,000	150,000	150,000	150,000
Sulfate		50,000	50,000	50,000	50,000	50,000
Stone:						
Basalt		403,233	456,300	464,236	384,138 [r]	NA
Calcareous:						
Dolomite	thousand metric tons	1,932	1,900 [e]	1,021	1,136 [r]	NA
Limestone, marl, calcite	do.	48,780	51,355	51,025	48,015 [r]	NA
Marble	do.	705	749	752	837 [r]	NA
Gabbro[e]	do.	100	100	100	100	100
Granite:						
Crushed	do.	30,000	29,665 [r]	30,000 [e]	26,779 [r]	NA
Ornamental	do.	540	646 [r]	659	NA	NA
Graywacke	do.	806	428	344 [r]	253 [r]	NA
Ophite	do.	52	52	51	43 [r]	NA
Quartz[e]	do.	16	5 [2]	5	5	5
Quartzite	do.	414	301	256	197 [r]	NA

See footnotes at end of table.

TABLE 1—Continued
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
INDUSTRIAL MINERALS—Continued						
Stone—Continued:						
Schist	thousand metric tons	173	259	208	156 [r]	NA
Slate[e]	do.	38	36 [2]	33	NA	NA
Syenite	do.	160	116	109	159 [r]	NA
Sulfur, byproduct, all sources[e]		27,000	25,000	25,000	25,000	25,000
Talc		5,459	6,231	5,362	5,517	12,367 [2]
MINERAL FUELS AND RELATED MATERIALS						
Coke, metallurgical[e]	thousand metric tons	300	300	300	300	300
Gas, manufactured[e]	thousand cubic meters	125	125	125	125	125
Petroleum refinery products:[e]						
Liquefied petroleum gas	thousand 42-gallon barrels	4,489 [2]	3,200	3,200	3,200	3,200
Gasoline	do.	23,469 [2]	20,000	20,000	20,000	20,000
Kerosene and jet fuel	do.	5,694 [2]	6,500	6,500	6,500	6,500
Distillate fuel oil	do.	37,084 [2]	30,000	30,000	30,000	30,000
Residual fuel oil	do.	17,995 [2]	19,000	19,000	19,000	19,000
Unspecified	do.	16,535 [2]	16,000	16,000	16,000	16,000
Refinery fuel and losses	do.	6,716 [2]	3,800	3,800	3,800	3,800
Total	do.	111,982 [2]	98,500	98,500	98,500	98,500

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. NA Not available. -- Zero.

[1] Table includes data available through June 30, 2008.

[2] Reported figure.

[3] Includes washed and unwashed kaolin.

[4] Not elsewhere specified.

Source: U.S. Geological Survey Minerals Questionnaire, Portugal, 2006-07.

TABLE 2
PORTUGAL: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Calcium carbonate		Omya Mineral Portuguesa Lda. (Salmon & Cia Lda.)	Mine and plant at Fatima	100
Cement		Cimentos de Portugal, SGPS, S.A. (Cimpor) (Government, 100%)	Plants (3) at Alhandra, Loule, and Souselas	12,000
Copper, concentrate		Lundin Mining Corp. (LMC)	Neves Corvo Mine near Castro Verde	100
Do.		do.	Aljustrel Mine near Castro Verde	20
Diatomite		Sociedade Anglo-Portugesa de Diatomite Lda.	Mines at Obidos and Rolica	150
Feldspar		A.J. da Fonseca Lda.	Seixigal Quarry, Chaves	10
Ferroalloys		Electrometalúrgia S.A.R.L.	Plant at Setubal	100
Kaolin		Saibrais Arelas e Caulinos S.A. (Denain Anzin Mineraux S.A.)	Mines at Casal dos Bracais and Mosteiros	175
Petroleum, refined	42-gallon barrels per day	Petróleos de Portugal (Petrogal) (Government, 100%)	Refineries at Porto and Sines	305,000
Pyrite		Pirites Alentejanas S.A. (EuroZinc Mining Corp.)	Mine at Aljustrel, plant at Setubal	100
Steel, crude		SN Servicos S.A. (Metalúrgica Galaica S.A., 100%)	Steelworks at Maia and Seixal	600
Do.		Lusosider Aços Planos S.A. (Corus Group, 50%, and Sollac S.A., 50%)	Rolling mill at Seixal	800
Tin		Primary Metals Corp.	Neves Corvo Mine near Castro Verde	15
Tungsten, concentrate	metric tons	Beralt Tin & Wolfram (Portugal) SARL	Panasqueira Mine and plant at Barroca	1,400
Uranium	do.	Empresa Nacional de Uranio S.A. (Government, 100%)	Mines at Guargia, plant at Urgeirica	150
Zinc, concentrate	do.	Lundin Mining Corp. (LMC)	Neves Corvo Mine near Castro Verde	25,000
Do.		do.	Aljustrel Mine near Castro Verde	20
Zinc, refined	do.	RMC Quimigal S.A.R.L.	Electrolytic plant at Barreiro	12

Do., do. Ditto.

THE MINERAL INDUSTRY OF ROMANIA

By Mark Brininstool

Romania's mineral production was mainly of regional importance and the country remained dependent on imports of mineral ores and concentrates to produce refined metals. On January 1, 2007, Romania joined the European Union (EU), but was still obligated to meet certain requirements, such as reduce the levels of corruption and industrial pollution, to qualify for the full benefits of EU membership. EU membership was affecting Romania's mineral industry as some facilities were being forced to modernize or close to meet EU standards and as increased access to European markets was creating trade opportunities.

Minerals in the National Economy

In 2007, Romania's real gross domestic product (GDP) grew by about 6% compared with the GDP in 2006. The value of industrial production increased by 5.1% and made up about 23% of the GDP in 2007 (National Institute of Statistics, 2008, p. 134, 135). In 2005 (the latest year for which data were available), mining and quarrying activities (including hydrocarbon extraction) accounted for about 5% of the value of industrial production and 1% of the GDP; metallurgy accounted for about 3% of the value of industrial production and 0.7% of the GDP (National Institute of Statistics, 2007, p. 437, 444, 446). The steep drop in the production of metal ores and some refined metals in Romania that began in 2006 most likely reduced the value of mineral production as a percentage of industrial production and the GDP in 2007.

Production

Production of most metals decreased significantly in 2007, whereas production of mineral fuels generally maintained 2006 production levels. In 2007, alumina production decreased by about 96% compared with production in 2006 because of the closure of the Cemtrade Oradea alumina plant in late 2006 and the temporary closure of the Alum S.A. alumina plant in February 2007 for modernization. Alum S.A. had not restarted alumina production by the end of 2007 (Vimetco N.V., 2008, p. 13, 19, 82; Central European Aluminum Co., 2009). Copper content of ore production decreased by 82%, and primary refined copper production decreased by 16%. Production of iron ore (metal content) decreased by 73% in 2007, and total ferroalloy production decreased by 52%; crude steel maintained its 2006 production level. Production of lead and zinc concentrate (metal content) decreased by 88% and 89%, respectively. Despite the reduction in lead and zinc mine output, primary refined lead production increased by 18%, and total refined zinc production increased by 34%. Production of manganese content of concentrate decreased by 15% in 2007.

The steep drop in the mine output of metals was most likely a result of mine closures and restructuring undertaken as a condition of membership in the EU. Romania was required to eliminate all subsidies given to metal and mineral mines by 2007 and all subsidies given to coal mines by 2010. In 2004, Romania received a loan from The World Bank to enact a mine closure program that would reduce the negative economic and social effects of shutting down certain mining operations (World Bank, The, 2004, p. 1). In 2006, the Romanian Government stated that companies that exceeded the EU target pollution rate and that had not been approved for special transition periods in which to reduce emissions would either be shut down or would face substantial fines. Implementation of the new policy was soon evident. For example, Compania Nationala Remin S.A., a state-owned mining company, announced in August 2006 that, in accordance with the World Bank sponsored program, it would suspend funding for 20 of its mines beginning in January 2007 (Rompres, 2006, 2007).

Industrial mineral production had mixed results in 2007. Diatomite production decreased by 99%, talc production decreased by 49%, and marketable kaolin and bentonite production decreased by 38% and 30%, respectively. Production increased significantly for feldspar (36%), cement (22%), and gypsum (15%).

In the mineral fuels sector, natural gas and crude petroleum production each increased slightly, whereas production of metallurgical coke decreased by 13% compared with production in 2006.

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

Outlook

Production of metal ores and concentrates fell sharply in 2007, and Romania's mineral industry will most likely maintain very low levels of production until the mining industry is fully privatized and restructured. Many mines are expected to remain closed permanently as subsidies are withdrawn to meet EU standards. Production of processed metals is expected to continue at about the same level, although producers will likely be under pressure to modernize facilities to meet EU standards. Coal production is also expected to decrease as subsidies are discontinued and mines are closed.

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TABLE 1
ROMANIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
METALS						
Aluminum:						
Alumina, calcined, gross weight		332,852	559,307	688,829	622,083 [r]	23,097
Ingot including alloys:						
Primary		196,844	222,347	243,605	266,585 [r]	286,266
Secondary		7,892	6,506	7,109	10,524 [r]	11,674
Total		204,736	228,853	250,714	277,109 [r]	297,940
Copper:						
Mine output, Cu content of concentrate		23,389	18,767 [r]	15,000 [r]	12,132 [r]	2,213
Metal:						
Smelter:						
Primary		4,456	61	--	--	--
Secondary[e]		500	10	10	10	10
Total		4,956	71	10	10	10
Refined:						
Primary		14,739 [r]	21,562 [r]	18,739 [r]	18,600 [r]	15,589
Secondary[e]		2,000	3,000 [r]	2,000	3,000 [r]	3,000
Total		16,739 [r]	24,562 [r]	20,739 [r]	21,600 [r]	18,589
Gold, mine output, Au content[e]	kilograms	400	400	400	400	400
Iron and steel:						
Iron ore:						
Gross weight	thousand metric tons	304	275	265	123 [r]	45 [e]
Metal content	do.	82	74	69	40 [r]	11
Metal:						
Pig iron	do.	4,101	4,244	4,098	3,946 [r]	3,923
Ferroalloys, electric furnace:						
Ferromanganese		--	191	18,625	3,329 [r]	--
Silicomanganese		141,899	194,754	100,957	53,085 [r]	26,868
Silicon metal[e]		100	--	--	--	--
Total		141,999	194,945	119,582	56,414 [r]	26,868
Steel, crude	thousand metric tons	5,692	6,077	6,280 [r]	6,266 [r]	6,261
Semimanufactures:						
Pipes and tubes	do.	453	486	529 [r]	580 [r]	468
Rolled products	do.	4,757	5,191	5,196	5,696 [r]	5,529
Lead:						
Mine output, Pb content of concentrate		15,747	18,297	11,610	6,269 [r]	784
Smelter, primary[e]		16,000	19,000	12,000	7,000	800
Refined:						
Primary		23,100	32,590	32,903	29,130 [r]	34,368
Secondary[e]		5,000	5,000	5,000	5,000	5,000
Total		28,100 [e]	37,590	37,903	34,130 [r]	39,368
Manganese:						
Ore, gross weight[e]	thousand metric tons	90 [3]	95 [3]	95	95	80
Concentrate:[4]						
Gross weight[e]	do.	60	65	65	65	55
Mn content	do.	15	16	14	13 [r]	11
Silver, mine output, Ag content		18	18 [e]	15	18	18 [e]
Zinc:						
Mine output, Zn content of concentrate		22,081	23,599	13,784	8,052 [r]	849
Metal, refined, primary and secondary		48,000	52,746	57,000 [r]	43,705	58,342
INDUSTRIAL MINERALS						
Barite, processed		23	--	--	--	--
Cement, hydraulic	thousand metric tons	5,992	6,239	7,032	8,252 [r]	10,061

See footnotes at end of table.

TABLE 1—Continued
ROMANIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
INDUSTRIAL MINERALS—Continued						
Clays:						
Bentonite:						
Run of mine[e]		40,000	40,000	40,000	40,000	30,000
Marketable		21,724 [r]	22,337 [r]	20,226 [r]	21,165 [r]	14,713
Kaolin:						
Run of mine[e]		70,000	70,000	65,000	65,000	35,000
Marketable		25,741 [r]	22,337	20,266	11,063 [r]	6,879
Diatomite		33,296	20,626	1,017	1,719 [r]	15
Feldspar		71,717 [r]	60,924	74,920 [r]	33,100 [r]	44,897
Fluorspar[e]		15,000	15,000	15,000	15,000	15,000
Graphite		-- [r]	395	478	--	--
Gypsum	thousand metric tons	394 [r]	490	502	615 [r]	707
Lime	do.	1,963 [r]	1,978	1,791 [r]	1,942 [r]	1,901
Nitrogen, N content of ammonia[e]	do.	1,180 [3]	1,182 [3]	1,300 [r]	1,300 [r]	1,300
Pyrites, gross weight[e]	do.	70	70	70	70	70
Salt:						
Rock	do.	47	43	46	47 [r]	51
Other	do.	2,417 [r]	2,357	2,374	2,574 [r]	2,424
Total	do.	2,464 [r]	2,400	2,420	2,621 [r]	2,475
Sand and gravel	do.	641 [r]	555 [r]	475 [r]	522 [r]	520
Sodium compounds, n.e.s.:[5]						
Caustic soda	do.	382	414	443	477 [r]	473
Soda ash, manufactured, 100% Na_2CO_2 basis	do.	407	398 [r]	346 [r]	453 [r]	453
Sulfur, byproduct, all sources[e]	do.	200	200	200	-- [r]	--
Sulfuric acid		65,000	28,000	11,000	5,000 [r, e]	--
Talc		10,082	10,000 [r, e]	10,000 [r, e]	2,967	1,513
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		2,000	-- [r]	-- [r]	-- [r]	--
Coal, washed:						
Anthracite and bituminous	thousand metric tons	3,309 [r]	3,016 [r]	3,079 [r]	2,587 [r]	2,500 [e]
Brown	do.	240	112	52	63 [r]	--
Lignite	do.	32,813	31,479	31,070	34,791 [r]	35,418
Total	do.	36,362	34,607	34,201	37,441	37,918
Coke:						
Metallurgical	do.	1,550	1,573	1,777	1,790 [r]	1,557
Other	do.	88	--	--	--	--
Total	do.	1,638	1,573	1,777	1,790 [r]	1,557
Gas, natural, gross:						
Associated	million cubic meters	1,345	1,267	1,220	1,088 [r]	1,123
Nonassociated	do.	11,829	12,023	11,252	10,854 [r]	10,858
Total	do.	13,174	13,290	12,472	11,942 [r]	11,981
Petroleum:						
Crude:						
As reported	thousand metric tons	5,651	5,465	5,212	4,777 [r]	4,837
Converted[e]	thousand 42-gallon barrels	42,500	41,000	40,000	36,000 [r]	36,000
Refinery products[e]	do.	75,000	75,000	70,000	70,000	70,000

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through March 31, 2009.

[2] In addition to the commodities listed, antimony, asbestos, and a variety of construction materials are produced, molybdenum may have been produced as a byproduct of copper from 1988 on, and small amounts of bismuth may have been produced; output is not reported quantitatively, however, and available information is inadequate to make reliable estimates of output.

[3] Reported figure.

[4] Estimated series are based on published data for concentrate production.

[5] Not elsewhere specified.

TABLE 2
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies (Government-owned unless otherwise specified)	Location of main facilities	Annual capacity
Alumina	Cemtrade Oradea (Part of CEAC Group)	Plant at Oradea, near Hungarian border	250.
Do.	Alum S.A. (99.4% controlled, directly or indirectly, by Vimetco NV)	Plant at Tulcea, Danube Delta	500.
Aluminum, primary	Alro S.A. (87% controlled, directly or indirectly, by Vimetco NV)	Slatina, 120 kilometers west of Bucharest	300.
Barite	Ministry of Industry	Ortra Mine, Rosia Montana, southwest of Cluj	100.
Bauxite	do.	Oradea-Dobresti Mining Complex, near Hungarian border	350.
Cement	Holcim (Romania) S.A. (Holcim, 100%)	Plant at Turda, 600 kilometers from Port of Constanta	1,360, cement; 850, clinker.
Do.	do.	Plant at Campulung, about 499 kilometers from Port of Constanta	2,200, cement; 1,360, clinker.
Do.	do.	Plant at Alesd, 812 kilometers from Port of Constanta	3,500, cement; 2,120, clinker.
Do.	Carpatcement Holding S.A. (HeidelbergCement, 99%)	Plant at Bicaz, about 450 kilometers from Port of Constanta	3,100, cement; 1,520, clinker.
Do.	do.	Plant at Fieni, about 420 kilometers from Port of Constanta	1,650, cement; 960, clinker.
Do.	do.	Plant at Deva, about 490 kilometers from Port of Constanta	1,650, cement; NA, clinker.
Do.	Lafarge Ciment (Lefarge Cement, 78%)	Plant at Hoghiz, 437 kilometers from Port of Constanta	2,200, cement; 1,520, clinker.
Do.	do.	Medgidia plant, about 35 kilometers west of Constanta	3,500, cement; 1,980, clinker.
Do.	do.	Plant at Targu Jiu, about 533 kilometers from Port of Constanta	3,000, cement; 2,045, clinker.
Coal:			
Bituminous	Compania Nationala a Huilei-Petrosani	Valea Jiului Mining Complex, near Hunedoara	10,400.
Lignite	Societatea National a Lignitului Oltenia-Targu Jui	Jiu Valley, Oltenia County, north of Craiova	20,300.
Do.	Societatea National a Carbunelui-Ploiesti	About 50 kilometers north of Bucharest	8,700.
Copper:			
Ore (concentrate, Cu content)	Compania Nationala REMIN S.A. and Compania Nationala Minvest	Baia Mare, Baia Sprie, and Cavnic Mines, in northwestern area near the Ukrainian border; Rosia Montana, Noud, Borsa Balan, and Lesul Ursului Mines, in east-west arc along Carpathian range; Rosia Poieni Mine; and Moldova Noua Mine, in southwest near Danubian border with Serbia	27.
Metal	Cuprom S.A. Baia Mare (Cuprom S.A.)	Outokumpu flash smelter and electrolytic refinery at Baia Mare in the northwest, near the Ukrainian border	40.
Ferroalloys	Ferom-Joint Stock Co.	Complex at Tulcea	280.
Iron ore	Compania Nationala Minvest	Mining complex at Hunedoara, in west-central Romania	1,320.
Do.	do.	Resita Mining Complex, southwestern Romania, near Serbian border	660.
Do.	do.	Napoca-Cluj Mining Complex, northwestern Romania on the Somesul River	990.

See footnotes at end of table.

TABLE 2—Continued
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies (Government-owned unless otherwise specified)	Location of main facilities	Annual capacity
Lead:				
In ore		Compania Nationala REMIN S.A.	Baia Mare Mine, near Ukrainian and Hungarian borders	24.
Do.		Compania Nationala Minvest	Balan Mine, 50 kilometers southwest of Piatra Neamt	10.
Metal		Sometra S.A. (Mytilineos Holdings S.A., 93%)	Imperial smelter at Copsa Mica, central Romania, on the Tirnava Mare River	18.
Do.		Neferal S.A. (Member of Metanef Group)	Bucharest	25.
Natural gas	million cubic feet per year	Ministry of Industry, Department of Energy	Tirgu Mures field at Tirgu Mures, north-central Romania	996,000.
Do.	do.	do.	Ploesti field, 50 kilometers north of Bucharest	249,000.
Petroleum:				
Crude	42-gallon barrels per day	do.	Ploesti-Teleajen, Pitesti, and Tirgoviste fields, in Prahova Valley around Bucharest; Bacau field at Bacau, east-central Romania near the Siretul River; and West Carpathian field, southeastern Carpathian Mountains, between the west bank of the Olt River and Tirgu Jiu	250,000.
Refined	do.	do.	Refineries at Brazil, Pitesti, Onesti, Barcau, Borzesti, Brasov, Cimpina, Darmanesti, Oradea, Ploesti, Teleajen, and Navodari	664,000.
Steel		Ductil Steel (part of Lakewind Ltd.)	Otelu Rosu in southwestern Romania	400.
Do.		Mechel Campia Turzii SA (Mechel)	Campia Turzii, Cluj, northwestern Romania	300.
Do.		ArcelorMittal Galati (Arcelor Mittal, 100%)	Galati, north of Brail, near the Ukrainian border	10,000.
Do.		ArcelorMittal Hunedoara (Arcelor Mittal, 100%)	West-central Romania, near Calan	2,135.
Do.		TMK-Resita (OAO TMK, 99.5%)	Southwestern Romania, about 20 kilometers southwest of Caransebes	450.
Do.		S.C. Donasid S.A. (Tenaris S.A., 99%)	Calarasi, near the Bulgarian border close to the Danube	470.
Do.		Mechel Targoviste (Mechel)	Targoviste, Dimbovita, near Bucharest	450.
Zinc:				
In ore		Compania Nationala Minvest	Baia Mare, near Ukrainian and Hungarian borders	12.
Do.		Compania Nationala REMIN S.A.	Vetel (Deva)	45.
Metal		Sometra S.A. (Mytilineos Holdings S.A., 93%)	Imperial Smelter at Copsa Mica, Tirnava River, central Romania	62

Do., do. Ditto. NA Not available.

THE MINERAL INDUSTRY OF RUSSIA

By Richard M. Levine, Mark Brininstool, and Glenn J. Wallace

Russia is one of the world's leading mineral producing countries and accounts for a large percentage of the former Soviet Union's (FSU's) production of a range of mineral products, including industrial minerals, metals, and mineral fuels. In 2007, Russia ranked among the leading world producers or was a significant producer of such mineral commodities as aluminum, arsenic, asbestos, bauxite, boron, cadmium, cement, coal, cobalt, copper, diamond, fluorspar, gold, iron ore, lime, lithium, magnesium compound and metals, mica (flake, scrap, and sheet), natural gas, nickel, nitrogen, oil shale, palladium, peat, petroleum, phosphate, pig iron, potash, rhenium, silicon, sulfur, titanium sponge, steel, tin, tungsten, and vanadium.

Minerals in the National Economy

The mineral raw material sector, which includes mineral extraction and processing, in Russia produced about 30% of the country's gross domestic product (GDP) and contributed about 70% of the country's budget revenues (Chanturiya, 2007). Analyses from the International Monetary Fund (IMF) and The World Bank have estimated that the oil and gas sector accounted for about 20% of the country's GDP (U.S. Energy Information Administration, 2007a). According to estimates by the IMF and The World Bank, Russia's oil and gas sector accounted for 64% of Russia's export revenues in 2007 and 30% of all foreign direct investment (FDI) in the country (U.S. Energy Information Administration, 2008a). The metallurgical sector accounted for about 5% of the GDP, 18% of industrial production, and 15% of exports (Parkhomenko, 2007). In 2006, 10,360,000 workers that made up 1.5% of the labor force were engaged in mining (Rossiya v Tsifrakh 2007, 2008a).

Russia, however, ranked among the lower 20% of mineral extracting countries in its per capita consumption of metals (Chanturiya, 2007). Domestic consumption of mineral products was increasing, however (Parkhomenko, 2007). Growth in domestic demand took place because of increased demand in the fuel, domestic machine manufacturing, and transport sectors. Owing to the need in these sectors for high-quality metals or a specific assortment of products not produced domestically, such as zinc-coated and alloyed steels and a variety of steel pipes, these industries still imported a percentage of these metal products (Nekrasov, 2007).

In 2007, out of total of 849.5 billion rubles[1] ($33.21 billion) invested in fixed capital for medium- and large-scale organizations engaged in the extractive industries, 774.5 billion rubles ($30.28 billion) was invested in the fuel sector and the remaining 75 billion rubles ($2.9 billion) was invested in the nonfuel mineral extraction sector. Investment in fixed capital in the mineral extraction sector accounted for 17.3% of total capital investment, of which investment in the fuel sector made up 15.8%, and in the nonfuel minerals sector, 1.5% (Federal'naya sluzhba gosudarstvennou statistiki, 2008).

Government Policies and Programs

Amendments proposed to Russia's law on the use of subsurface resources were ratified on January 31, 2007. These amendments set criteria for deposits containing strategic commodities and limited the rights of foreigners to invest in a controlling stake in such deposits that have not yet been developed with foreign participation. Strategic deposits include oilfields with more than 70 million metric tons (Mt) of reserves, natural gas fields with more than 50 billion cubic meters of reserves, copper fields with more than 500,000 metric tons (t) of copper contained in the ore, and vein gold fields with more than 50 t of gold contained in the ore. All mineral deposits of diamond, pure quartz, and uranium are considered strategic. These new amendments set criteria for strategic deposits that are much lower for oilfields and gasfields than criteria proposed earlier and encompass, therefore, a much larger number of these fields—about 30 oilfields and 40 gasfields. For copper, three deposits, including the Udokan deposit, would be listed as strategic, and for gold, the Sukhoy Log deposit would be listed as strategic (Interfax Russia & CIS Metals and Mining Weekly, 2007m). A newer version of the law on strategic resources unveiled in 2008 adds beryllium, cobalt, lithium, niobium, platinum-group metals (PGM), and the yttrium group of rare earths to the list of strategic deposits (Interfax Russia & CIS Metals and Mining Weekly, 2008a).

United Company RUSAL (UC RUSAL) stated that it understands the importance of climate change to future generations and set a goal to reduce emissions from its smelters by a total of 50% by 2015. It planned to spend $1.4 billion by 2013 for this purpose. All smelters were to be modernized to conform to one standard. UC RUSAL was planning to have its operations be carbon neutral through improved energy efficiencies and through recycling. The company was deriving about 80% of its electricity from hydroelectric sources, and developing hydroelectric projects was a prominent feature of UC RUSAL's development plans. UC RUSAL was also devoting substantial resources to researching and developing more environmentally friendly ways to use coal. By increasing recycling, UC RUSAL would save substantial energy, as remelting aluminum requires only 10% of the energy used to produce primary aluminum. UC RUSAL claimed that it was the first major Russian company to take these steps and hoped that it would set an example for other Russian companies (Interfax Russia & CIS Metals and Mining Weekly, 2007j).

Production

Russia, according to calculations by the Center for Strategic Research at Moscow State Mining University, was the leading country in the world in the number of minerals that it mined (Chanturiya, 2007). In 2007, the value of output in the mineral extraction sector increased by 1.9% compared with that of 2006; within this sector, the value of extraction of fuel minerals increased by 1.9%, and of that of nonfuel minerals, by 1.6% (Federal'naya sluzhba gosudarstvennou statistiki, 2008). In 2007, production increased compared with that of 2006 for a number of metals in ores and concentrate, but decreased significantly for the production of these same metals. Some increases were large; for example, production of lead in concentrate increased by more than 45%; molybdenum in concentrate, by more than 30%; copper in concentrate, by almost 11%; tungsten in concentrate, by about 10%; bauxite, by about 6%; and nickel ore, by 5.5%. Production decreased significantly, however, for molybdenum metal, which fell by about 34%; cobalt metal, which fell by about 25%; tin metal (including secondary) and tungsten metal, by about 24% each; and magnesium metal and its alloys, by about 7%. Production of copper and nickel metal also decreased by a small amount. Production increases, however, were reported for such metals and metallurgical products as lead metal (including secondary lead), which increased by more than 20%, and primary aluminum, which increased by about 6%. Production of rolled titanium was reported to have increased by 15.8%; zinc metal, by about 8%; titanium sponge, by almost 7%; and alumina, by more than 3% (table 1; Metall Ukrainy, 2008a).

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[1] Where necessary, values have been converted from Russian rubles to U.S. dollars (US$) at the rate of 25.581 rubles=US$1.00.

Structure of the Mineral Industry

At the end of 2007, Russia had 16,100 enterprises engaged in mining and quarrying, which was an 8.7% increase compared with the number of enterprises in the previous year (Federal'naya sluzhba gosudarstvennou statistiki, 2008). Russia had more than 100 large-capacity mining and beneficiation and mining and metallurgical enterprises that mined and processed ferrous and nonferrous metals. The country had 238 coal mining enterprises, which mined coal at 104 underground mines and 134 open pits. Coal processing took place at 42 beneficiation plants, 27 beneficiation installations, and 17 sorting stations (Chanturiya, 2007; Linyev and others, 2007). Almost all coal mining enterprises were privately owned (Tarazanov, 2008). The leading enterprises in the nonferrous metals sector included UC RUSAL for aluminum and MMC Norilsk Nickel for cobalt, copper, gold and other byproduct metals, nickel, and PGM. In the ferrous metals sectors, the major metallurgical enterprises were EvrazHolding Group Ltd., Holding Company Metalloinvest, Mechel Steel Group OAO [Open Joint Stock Company], OJSC (Open Joint Stock Company) Novolipetsk Steel Co., OJSC Magnitogorsk Iron and Steel Works, and Severstal' enterprises (Parkhomenko, 2007).

Russian policymakers had been advancing state control of the energy sector and Government-controlled Russian oil and gas companies were obtaining controlling stakes in previously foreign-led projects (U.S. Energy Information Administration, 2008a).

In 2007, a controversy was taking place concerning the ownership of Norilsk Nickel, which was the country's leading mining and metallurgical enterprise. On January 31, Interros Holding Co., which was the major shareholder in Norilsk Nickel, announced that Interros would be restructured and that the company's two partners would split the company's assets. The restructuring of Interros led to a complicated division of all the partners' assets, the most prominent of which was the majority stake in Norilsk Nickel.

When it announced the restructuring, Interros stated that one of the partners would maintain ownership of Interros, which would retain all its shares of Norilsk Nickel. The other partner was to form a separate holding company (which became Onexim Group) and would focus on energy-related enterprises. On March 15, Onexim Group was officially launched and was based on the assets of the former Interros partner, including a 22% interest in Norilsk Nickel, a 22% stake in Polyus Gold, and a 50% interest in Interros (Interros Holding Co., 2007; Onexim Group, 2007; Shuster, 2007).

In September, the owner of Onexim Group reportedly purchased an additional 3% stake in Norilsk Nickel and a 3% stake in Polyus Gold, which gave him direct ownership of a blocking stake in each company. (Shareholdings of more than 25% in either company gave the holder a blocking share.) At the same time, various news organizations reported the possibility that Onexim Group was in talks with other companies interested in purchasing its shares in Norilsk Nickel. These two events indicated that the division of the Interros assets was not going as originally planned and that the two former partners were possibly competing for control of the various companies in which they shared ownership (Interfax Russia & CIS Metals and Mining Weekly, 2007c; Reuters, 2007).

On November 21, Onexim Group offered Interros the right of first refusal for the purchase of a 25% plus 1% share in Norilsk Nickel. The offer gave Interros 30 calendar days to accept the offer and 45 days to close the deal with the purchase of the shares for cash. Two days later, UC RUSAL announced that it had come to an agreement with Onexim Group to purchase the stake offered to Interros if the deal was not finalized. Interros failed to meet the December 21 deadline to accept the offer and UC RUSAL stated that it would purchase the shares. As 2007 ended, UC RUSAL was syndicating a loan for the purchase and trying to obtain final legal approval from various Government agencies to complete the purchase (Interfax Russia & CIS Metals and Mining Weekly, 2007b, d, f, g, h, i).

Mineral Trade

In 2007, the composition of Russia's commodity exports registered some change outside the Commonwealth of Independent States (CIS) compared with that of 2006. Crude oil exports, which composed 52.9% of the value of the country's fuel and energy exports outside the CIS, increased by 18.4% in value and 4.8% in volume. Exports of refinery products, which made up 24% of the value fuel and energy exports outside the CIS, increased by 7.6% in volume. Bituminous coal exports increased by 4.9% in volume and 19% in value (Interfax Russia & CIS Statistics Weekly, 2008).

Metals and metal products were Russia's second ranked commodity export group, with exports increasing to 14.3% of the value of total exports outside the CIS in 2007 compared with

13.8% in 2006. Exports in this category increased by 19.5% in value but decreased by 7.6% in volume as the average contract price for metals and metal products rose. The average export prices increased by 40% for nickel, 28.3% for pig iron, 25.2% for iron semimanufactures, 16.2% for aluminum, and 10.9% for copper (Interfax Russia & CIS Statistics Weekly, 2008).

In 2007, the value of exports of chemical products increased to 5.4% of exports outside the CIS from 5% in 2006. Exports of methanol increased by 26.2% in value and 17.2% in volume; those of potash fertilizer increased by 20.4% in value and by 39.9% in volume, but exports of ammonium anhydride fell by 16.4% in value and 5.8% in volume (Interfax Russia & CIS Statistics Weekly, 2008).

In 2007, Russian exports of ferrous metals totaled 42.913 Mt and were valued at $21.110 billion. According to available data, in the ferrous sector in 2007, Russia exported 14.6 Mt of carbon steel semimanufactures, 8.1 Mt of flat-rolled carbon steel, 6.6 Mt of pig iron, and 776,000 t of ferroalloys. In the nonferrous sector in 2007, Russia exported 3.74 Mt of aluminum exports compared with 4.06 Mt in 2006. In 2007, copper exports decreased to 271,000 t or by 12.9% compared with output in 2006, and nickel exports decreased to 260,000 t or by less than 1%. In the mineral fuels sector in 2007, Russia's exports of hard coal increased by 19% in value and 4.9% in volume compared with those of 2006; exports of crude oil increased by 18.4% in value and 4.8% in volume and exports of refinery products increased by 7.6% in volume (Interfax Russia & CIS Statistics Weekly, 2008).

Only a small percentage of Russian exports of mineral products went to countries of the CIS. The leading consumer of Russian energy products was the European Union (EU), which accounted for 63% of Russia's total oil exports and 65% of its gas exports. Russia was the EU's single leading supplier of oil and gas and provided 27% of total EU oil imports and 44% of total EU natural gas imports (Moscow News, 2007; Rossiya v Tsifrakh 2007, 2008b).

Commodity Review

Metals

Aluminum.—OAO RUSAL was Russia's leading domestic aluminum producing company and OAO SUAL was the second ranked domestic aluminum producer and the leading domestic bauxite producer. Together these two firms controlled all Russian aluminum and alumina and bauxite production enterprises. In March, the OAO RUSAL merged with SUAL and with the alumina assets of Switzerland-based Glencore International AG to become United Company RUSAL (UC RUSAL) (United Company RUSAL, 2008). The merged firm employed 100,000 people worldwide.

UC RUSAL's Khakas aluminum smelter was the first aluminum production facility built in Russia in the past 20 years. The first batch of aluminum was manufactured at the Khakas smelter in December 2006. The total amount of investment in the project exceeded $750 million. The Khakas smelter was projected to reach its installed capacity in October 2007. It had 600 employees (United Company RUSAL, 2007).

In 2006, RUSAL had begun work to construct a 750,000-metric-ton-per-year (t/yr) greenfield aluminum smelter in Taishet, which is a small town located near Irkutsk. The construction was expected to be completed in 2011. The company also was carrying out large-scale modernization of the Irkutsk aluminum smelter, which was commissioned in 1962. After commissioning of a new potline no. 5, the total capacity of the smelter would increase by 50% to 450,000 t/yr. The first stage of potline no. 5 was to start production in 2007, and full capacity for potline 5 was to be achieved in 2008. Construction of potline no. 6 was planned to begin after the construction of potline no. 5 was completed. When the planned construction of potline no. 6 is completed in 2009, the smelter's production capacity would be 500,000 t/yr (United Company RUSAL, 2008).

Plans for RUSAL also called for modernizing the Sayanogorsk aluminum smelter in 2006 to increase output of aluminum and alloys and to modernize the Nikolayev alumina refinery in Ukraine to increase output to 1.6 million metric tons per year (Mt/yr) of alumina. RUSAL also planned to continue to expand production capacity at the Achinsk alumina refinery, which would enable it to increase its output to 1.1 Mt/yr of alumina (United Company RUSAL, 2008).

Included in UC RUSAL's investment project portfolio was the Komi Aluminum project, which was initiated by SUAL. The project entailed the development, construction, and operation of a bauxite-alumina complex in the Komi Republic. The complex would be supplied by ore from the Middle Timan bauxite deposit, which was under development, and would include an alumina refinery to be constructed at Sosnogorsk. The design capacity of the complex was 6.5 Mt/yr of bauxite and 1.4 Mt/yr of alumina. Plans called for bauxite production at Komi to reach 6.5 Mt/yr in the 2009-10 period. Construction of the alumina plant in Sosnogorsk had not begun, and the functioning of the alumina plant would depend on its obtaining an uninterrupted supply of bauxite from the Komi project when it achieved its design capacity to produce 6.5 Mt/yr of bauxite. The completion of the Komi project would considerably reduce the Russian aluminum industry's dependence on foreign countries for bauxite and alumina (Broneyoy and others, 2007).

UC RUSAL planned to increase primary aluminum production to 4.4 Mt in 2008 and to 6.2 Mt in 2013, and most of the increased output would go to China. UC RUSAL's acting director for marketing and sales said that Asia would account for 50% of UC RUSAL's aluminum sales by 2015, of which 70% totaling more than one-third of UC RUSAL's output would go to China. Also, the director predicted that Russia's consumption of aluminum could increase by an average of 11% per year until 2015 (United Company RUSAL, 2008).

Antimony.—Russia reportedly ranked second in the world to China in antimony reserves. Russia's antimony reserves are located primarily in the Sakha (Yakutiya) Republic. These reserves are comparatively rich in antimony content with ores that grade between 20% and 25% antimony. Practically all explored reserves are located in the Sarylakh and Sentachan deposits, which contain reportedly 200,000 t of antimony reserves; these reserves comprise 83% of the country's total reserves of almost 240,000 t, which are contained in nine deposits. Ore from the Sarylakh deposit contains an average grade of 13.2% antimony, which can be beneficiated to obtain a concentrate containing 60% antimony. Ore from the Sentachan deposit contains an average grade of 28.7% antimony and the concentrate produced contains 58.9% antimony. Ore from these deposits was processed using a gravitation-flotation beneficiation method (Solozhenkin, 2007).

Beryllium.—The country's beryllium consumption was between 2 and 3 t/yr and was projected to increase to between 10 and 12 t/yr by 2010. Reserves of beryllium are located in 27 deposits and subeconomic (zabalansovye) reserves are located in an additional 8 deposits. Most of these deposits have complex pegmatitic ore, and beryllium would be a byproduct. The most prospective deposit was reportedly the Yermakovskoye fluorite-bertrandite-phenacite deposit in the Republic of Buryatia, the development of which would fully satisfy the country's future demand for beryllium (Kurkov and Kotova, 2007).

Cobalt.—Ufaleynikel (a division of Industrial Metallurgical Holding located in Chelyabinsk Oblast' in the Ural Mountains region), had been producing cobalt metal and cobalt oxide from concentrate supplied according to a contract with Norilsk Nickel. However, at the start of 2007, Norilsk Nickel bought a stake in OM Group, Inc. of the United States and agreed for a period of 5 years to supply the OM Group with as much as 2,500 t/yr of cobalt metal, 2,500 t/yr of cobalt in hydroxide, and 1,500 t/yr of cobalt in sulfide solution, which was almost all the cobalt produced by Norilsk Nickel. Norilsk stopped supplying Ufaleynikel with cobalt in concentrate and Ufaleynickel reduced cobalt production by 40.5% to 1,111 t in the first 9 months of 2007 (Interfax Russia & CIS Metals and Mining Weekly, 2008c).

Copper.—Norilsk Nickel was Russia's leading copper-producing enterprise. In 2007, Norilsk Nickel's refined copper production totaled 404,465 t at the company's operations in Russia, which was about 5% less than Norilsk Nickel produced in 2006. In 2007, at its major mining operations on the Taymyr Peninsula in East Siberia, Norilsk Nickel continued its trend of mining larger quantities of cuprous ores, which have a higher content of copper relative to nickel than do the nickel rich ores, which were being depleted. Norilsk Nickel also increased production of disseminated ores, which have lower grades of all metals. The nickel-rich ores that were being depleted, however, had the highest copper content of ore types at Norilsk Nickel (MMC Norilsk Nickel. 2009).

Copper metal production at Norilsk Nickel's operations on the Kola Peninsula in 2007 decreased by 11% compared with that of 2006 to 66,000 t, although ore output remained at the same level of 7.6 Mt (MMC Norilsk Nickel. 2009). Based on the results of an independent audit conducted in accordance with the standards of the Australasian Joint Ore Reserves Committee (JORC), proven and probable reserves of copper contained in deposits on the Kola and the Taymyr Peninsulas exceeded 9 Mt (MMC Norilsk Nickel, 2007)

The Urals Mining and Metallurgical Co. (UMMC), which was Russia's second ranked copper producer with 47 enterprises in 11 regions managed by UMMC Holding, had about a 40% share of the domestic copper cathode market. In 2007, UMMC's Uralelektromed copper refinery acquired exploration and mining licenses for the Stepnoye and the Talovskoye deposits in Altay Kray. (These deposits would also be mined by the Russian lead and zinc mining company Siberian Polymetals.) Mining at Stepnoye was scheduled to commence in 2010. The deposit would be mined using an open pit method for the first 10 years and was projected to produce between 400,000 and 450,000 t/yr of ore. Development subsequently would be converted to underground mining. The Talovsky Mine (at the Talovskoye deposit) was scheduled to come onstream in 2011; it would have the capacity to produce 200,000 t/yr of ore. This deposit would be developed by underground mining. Ore from both deposits would be processed at the Rubtsovsk mill, which, following renovation, would have the capacity to process 1.2 Mt/yr of ore. In 2004, UMMC acquired a complex of unfinished facilities at the site of the Rubtsovsk Mine and began restoration of the facilities. In 2006, a concentration plant was commissioned with a capacity to process 400,000 t/yr of ore (Interfax Russia & CIS Financial & Business Report, 2008b).

In 2007, UMMC had the capacity to produce 380,000 t/yr of copper cathodes (Interfax Russia & CIS Metals and Mining Weekly, 2007o, p). The company was planning to increase production in 2010 to 500,000 t of refined copper. Plans called for reconstruction of an electrolysis unit, which would enable UMMC to increase copper cathode production to 500,000 t/yr (Interfax Russia & CIS Metals and Mining Weekly, 2008e).

Russian Copper Co. (RCC) (which was located in Ekaterinburg) was founded in 2004 and was the country's third ranked copper company. It consisted of 20 mining and metalmaking enterprises that operated in Russia in the Altay Kray; in the Chelyabinsk, the Novgorod, the Orenburg, and the Sverdlovsk Oblasts; in the Republic of Dagestan; and in Kazakhstan. RCC produced about 20% of Russia's copper metal output and about 1% of the world's copper metal output (Minicom Ltd., 2008). RCC combined 11 upstream and downstream enterprises that mined and processed copper ores and produced copper products. Plans called for RCC to increase copper cathode production to 185,000 t using its own raw materials. RCC planned to increase copper cathode output to 290,000 t in 2010. In 2007, RCC planned to add a third electrolytic plant at Kyshtym with a capacity of 100,000 t/yr; the first 50,000 t of capacity to be added in the late spring and the remaining 50,000 t would be added in December (Interfax Russia & CIS Metals and Mining Weekly, 2007k).

Reserves were being reevaluated at the Udokan copper deposit in Chitinskaya Oblast, which is one of the largest copper deposits in the area of the FSU. The reevaluation was to be completed at the end of 2009. Owing to the size of its reserves, Udokan was being classified as a strategic deposit, which means that foreign companies would not be able to have a controlling interest in the ownership of the deposit (Interfax Russia & CIS Metals and Mining Weekly, 2007n).

Gold.—Gold output in 2007 in Russia fell for the fifth year in succession, decreasing to 162.779 t, or by 0.9% compared with output in 2006. Mine output of primary gold, which did not include byproduct gold, decreased by 1.9% to about 144.791 t, but byproduct gold output increased by 3.4% to 12.121 t. Secondary gold production increased by 17.8% to almost 5.867 t (Interfax Russia & CIS Metals and Mining Weekly, 2008b). The leading gold producing region in 2007 was Krasnoyarsk Kray, which produced 32.949 t, followed by the Sakha (Yakutiya) Republic, with 18.921 t; Magadan Oblast', with 14.901 t; Irkutsk Oblast, with 14.881 t; Khabarovsk Kray, with 14.773 t; and Amur Oblast, with 14.709 t. The remaining eight major gold producing regions each had output of less than 7 t in 2007. Gold production increased in regions with predominately lode deposits, which included the Amur, the Irkutsk, the Kamchatka, and the Krasnoyarsk regions. Production fell, however, in areas with predominately placer deposits, which included Magadan Oblast', which in the past had been Russia's leading gold producing region, and in Khabarovsk Kray (Interfax Russia & CIS Metals and Mining Weekly, 2008b).

Although in the past, gold production from placer deposits was the leading source of Russian gold production, in 2007, it accounted for only about 40% of output. Reserves at placer deposits were being depleted and production capacity was being transferred to the mining of hard rock deposits. Depletion of reserves at placer mines also was attributable in part to a lack of resources by the small companies mining these deposits to conduct necessary exploration (Brayko and Ivanov, 2007). Russia's gold production could begin to increase as new deposits, such as the Kupol field in Kamchatka, are commissioned (Interfax Russia & CIS Metals and Mining Weekly, 2008b).

Indium.—In Russia, zinc and indium are extracted from copper porphyry deposits in the Ural Mountains region, where 75% of the country's zinc concentrates are produced and which have an average indium content of 3.2 grams per metric ton (g/t). Indium is also obtained from lead-zinc ores from deposits in southern Siberia and in the Maritime Province in the Russian Far East where the indium content averages 14.7 g/t. Indium reserves have been identified in 61 deposits in the country. Up until the middle of the 1990s, indium was produced at the Chelyabinsk zinc plant, the Elektrotsink plant in Vladikavkaz, and the Novosibirsk tin complex. High-purity (4 nines) indium was produced at the Podol'sk chemical-metallurgical plant. In 2007, indium was being produced at the Chelyabinsk and the Elektrotsink plants. The Chelyabinsk plant had the capacity to produce between 3 and 6 t/yr of indium, and the Elektrotsink plant, up to 6 t/yr. In 2005, Russia had exported 7.6 t of indium and, in 2006, 5.8 t. Primary indium was produced only at the Chelyabinsk plant, which was producing between 4 and 5 t/yr of indium; the remaining indium was produced from recycled material (Naumov, 2008).

Iron and Steel.—In 2007, Russia increased output of crude steel by 2.2% to 72.389 Mt and output of rolled steel by 2.5% to 59.660 Mt. Output of steel produced in oxygen converters fell by 1.1% to 41.209 Mt, but steel produced in electric arc furnaces (EAFs) increased by 18.6% to 19.291 Mt. Output of stainless steel decreased by 1.9% to 109,000 t. Pig iron production decreased by 1.6% to 51.522 Mt (Interfax Financial & Business Report, 2008a). Steel pipe production in Russia increased by 10.2% to 8.706 Mt (including 3.125 Mt of seamless pipes), which was an increase of 5.3%, and 5.333 Mt of electrowelded pipes, which was an increase of 13.3% (Interfax Financial & Business Report, 2008a).

In 2007, Russia was the fourth ranked steel producer in the world (Fenton, 2008). Eight steel mills produced almost 90% of the country's crude steel output. Russia was also the world's leading steel exporting country. It exported about 27 Mt of steel products, which was 45% of its total production of steel products. It imported 6 Mt. In 2007, Russia consumed 38.6 Mt of finished steel products, which was 17% more than in 2006. The increase in domestic consumption was mainly the result of increased demand for steel in the fuel and energy sectors, the machine-manufacturing sector (which produced equipment for oil-extraction and oil-refining), and the automotive industry. The Ministry of Economy and Industry projected that Russian steel consumption by 2010 would increase by 32% to 51 Mt/yr (Steelonthenet.com, 2008).

Russia was engaged in modernization and expansion of its steel sector, which included constructing a number of minimills. The share of EAF steel was projected to increase to about 35% in 2015. Scrap collection in Russia averaged between 30 and 34 Mt/yr and the country had a scrap reserve of about 1.8 billion metric tons (Gt). Scrap consumption had averaged between 24 and 25 Mt/yr. In 2007, Russia exported about 7.7 Mt of scrap. In 2007, the Novolipestk metallurgical complex acquired the Russian scrap collection and long product (reinforcing bars) producer Maxi-Group (Steelonthenet.com, 2008).

The Russian sector for coated steel was also rapidly increasing output as production by volume had increased by between 11% and 19% per year for the past 3 years. Although most of this increase had been to produce coated steel for export, domestic consumption had also grown and, in 2007, reached about 2 Mt of galvanized steel and an additional 1 Mt of polymer-coated steel. In 2007, Severstal took 100% ownership of the JV SeverGal galvanizing plant, which was located in Cherepovets, after buying out ArcelorMittal's stake (Steelonthenet.com, 2008).

In 2007, Russian companies were actively engaged in investing in foreign steel companies. This included the Evraz Group acquiring Claymont Steel Holdings of Claymont, Delaware; Delong Holding Ltd. of China (which had 3 Mt/yr of capacity); Highveld Steel & Vanadium Corporation Ltd. of South Africa; and Oregon Steel Mills of Portland, Oregon. Severstal has developed a North American division based on the assets of Rouge Industries, Inc., which included Rouge Steel (the fifth ranked integrated steel producer in the United States). In 2007, Severstal commenced operations at the SeverCorr minimill in Mississippi and acquired Illinois-based Esmark's Wheeling-Pittsburgh Steel and ArcelorMittal's Sparrows Point plant in Baltimore, Maryland. Severstal also had a 79% ownership of the Lucchini Group in the EU. In 2007, Russia's Estar Group, in conjunction with the international steel trading company Stemcor, acquired Istil Group Holdings of Ukraine.

In 2007, Russia's Metalloinvest Holding Co. commenced construction of a new rolling mill in the United Arab Emirates. The Magnitorgorsk metallurgical complex, together with the Atakas-Group of Turkey, began construction of a new minimill in Turkey (Steelonthenet.com, 2008). Plans called for completely eliminating open-hearth steel production by 2010, which would necessitate a change in the type of refractory raw materials in use and could increase the demand for less conventional refractory raw materials, such as andalusite, bauxite, kyanite, sillimanite, and zirconium (Shevelyev and Tokhtas'yev, 2006).

Iron Ore.—In 2007, Russia's iron ore mining industry increased production to 105 Mt, or by 2.9% compared with output in 2006. The major iron ore producers were the enterprises in the Kursk Magnetic Anomaly (KMA), in the North West region, and in the Ural Mountains region. Russia had 12 main iron ore mining and beneficiation enterprises (GOKs), as well as some smaller producers. The leading producers in the KMA were the Lebedinsky, the Mikhailovsky, and the Stoylensky GOKs; in the North West region, they were the Kovdorskiy and the Olenogorskiy GOKs and the Karelian pellet plant; and in the Ural Mountains region, they were the Bakalsk, the Bogoslovsk, the Kachkanarsk, and the Visokogorsk Mines. Only one large GOK, the Korshunovskiy, is located in Siberia. The three largest GOKs in terms of output—the Lebedinsky, the Mikhailovsky, and the Stoylensky—provided more than 50% of Russia's total output, and the largest GOK—the Lebedinsky—supplied 21% of the total, followed by the Mikhailovsky (20%), and the Stoylensky (12%) (Steelonthenet.com, 2009).

The iron content of Russian iron ores averages between 30% and 35% iron, which is of higher grade than ore from China and Ukraine but of lower grade than ore from Australia and Brazil where ores average more than 50% iron. More than 60% of the iron ore mined in Russia was beneficiated. Only 12.5% of the iron ore produced in Russia had an iron content of more than 60% (Steelonthenet.com, 2009).

In Russia, almost all GOKs were part of large, vertically integrated metallurgical groups that were dominated by major steelmaking companies (Evraz, Mechel, NLMK, and Severstal). Only the Metalloinvest company was an exception, as its GOKs were of more significance than its steelmaking division (Steelonthenet.com, 2009).

The majority of Russian iron ore was consumed domestically, but a number of GOKs exported significant volumes. The leading GOKs (Lebedinsky and Mikhailovsky) exported iron ore to countries in Asia, Europe, and the Middle East. Although Russia exported iron ore, it also imported iron ore mainly from Kazakhstan for the Magnitogorsk Iron and Steel Works, which purchased about 10 to 11 Mt/yr of iron ore from the Sokolovsko-Sarbayskoe Production Association in Kazakhstan (Steelonthenet.com, 2009).

Russia's reported iron ore reserves are located in 172 deposits, 53 of which were being mined. The basic iron ore reserves are composed mainly of magnetite and hematite-magnetite ores; the average iron content in the magnetite ores ranges between 31% and 35%, and in the hematite ores, between 40% and 50%. The different ore types require specialized technologies to beneficiate to produce a marketable product (Avdokhin and Gubin, 2007). Russia's iron ore reserves were reportedly adequate for about 200 years at current production levels (Steelonthenet.com, 2009).

Lead and Zinc.—The leading zinc producer in Russia was the Chelyabinsk Zinc Plant (CZP); it was the only zinc plant in the CIS that produced special high-grade (SHG) zinc confirmed by LME certification. In 2007, CZP produced 165,007 t of SHG zinc and zinc-based alloys. The director of CZP projected that zinc consumption in Russia would nearly double to 400,000 t (Metal Supply and Sales, 2009).

Russia possesses 17% of the world's zinc reserves (about 45 Mt) and has the two largest zinc deposits in the world (the Kholodninskoe and the Ozyornoe, which are located in the Republic of Buryatia). In the environment of high metals prices in 2007 and the growing global demand for metal, greater interest by investors in exploration of these deposits was expected, which could allow a doubling of zinc concentrate production in Russia within 5 to 7 years.

Zinc consumption in Russia in 2006 reached 174,000 t compared with 900,000 t/yr annually in the Soviet era. The difference in consumption occurred as zinc supplies decreased to the military industry. In Russia, more than 60% of zinc was used for the production of galvanized steel, mainly for the automobile and construction industries. According to forecasts by CZP's commercial director based on trends in 2006, in Russia construction volumes could increase by more than 50% by 2010, and automobile production could double by 2015. Also, substantial potential existed for zinc consumption to increase in such areas as alloy production and usage in the chemical industry. Even with increasing zinc consumption within the country, Russia would likely remain a net zinc exporter as production exceeded consumption by 62,000 t in 2006 (Metal Supply and Sales, 2007).

UMMC, which was Russia's second ranked copper producer and whose facilities were centered in the Ural Mountains region, produced about 50% of Russia's lead metal and 40% of its zinc metal (Interfax Financial & Business Report, 2008c). UMMC planned to increase zinc metal production to 250,000 t in 2012, or by 184% compared with that of 2006. UMMC produced about 88,000 t of zinc in 2006. Plans called for UMMC to construct a 140,000- to 150,000-t/yr-capacity zinc smelter in the Sverdlovsk region, which would be capable of processing all UMMC's raw materials. The new smelter was to be commissioned in the summer of 2008. Plans called for UMMC to increase production to 110,000 t in 2009. UMMC processed most of its zinc at its zinc refinery in Vladikavkaz, which had a capacity to produce 90,000 t/yr (Interfax Russia & CIS Metals and Mining Weekly, 2007d, p).

Siberian Polymetals, which was a subsidiary of UMMC, planned to commission the Zarechenskiy Mine in June, which would increase polymetallic ore production by 100,000 t/yr in the first stage; the design capacity of 300,000 t/yr of ore would be reached in 2009. In 2007, the new mine was projected to produce 30,000 t of ore. Reserves were reportedly 1.3 Mt of ore (Interfax Russia & CIS Metals and Mining Weekly, 2007d).

Lithium.—In the mid-1980s, the Soviet Union, which was producing about 10 t/yr of lithium calculated in carbonate equivalent, was the world's second ranked lithium producer following the United States. It was mining low-grade ore from the Zavitinskoye deposit, which had an average lithium oxide content of 0.6%. After the dissolution of the Soviet Union, this deposit was not profitable for Russia to mine under market economy conditions, and production was mothballed.

Russia occupies a leading position in the world in lithium reserves, which are located primarily in two regions. One region is the Kola Peninsula, which has reserves of about 7 Mt of lithium oxide; the other is the Sayanakh region, which has reserves of 1 Mt of lithium oxide. Programs had been drawn up to restart production at the Zavitinskoye deposit and at the Achikanskiy sector near the Etykinskoye deposit, which has a lithium oxide content of between 0.7% and 0.8%. Decisions about the future development of lithium reserves would depend on changes in the use of lithium in the 21st century and technological developments for processing lithium (Kurkov and Kotova, 2007).

Nickel.—In 2007, Norilsk Nickel was the world's leading nickel producer; it had nickel mining and processing operations on the Taymyr Peninsula in Siberia and on the Kola Peninsula in the northwestern part of the country, as well as in Botswana and Finland. In 2007, the company produced 234,454 t of nickel metal products at its Russian operations compared with 244,000 t in 2006 (MMC Norilsk Nickel, 2008). Norilsk's mining operations on the Taymyr Peninsula consisted of seven mines.

On March 1, Norilsk Nickel Finland became part of Norilsk Nickel as a result of Norilsk Nickel's acquisition of OM Group Inc.'s nickel business, which included the Harjavalta refinery in Finland. OM Group was a producer of metal-based specialty chemicals. In November 2006, Norilsk Nickel had agreed to supply practically all its cobalt to OM Group (Ghosh, 2007).

The Harjavalta refinery was commissioned in 1959 and expanded in 1995 and again in 2002; the latest expansion included the construction of the chemical plant. The Norilsk Nickel Harjavalta refinery had the capacity to produce 60,000 t/yr of nickel products. The refinery produced nickel cathodes, briquets, and salts, as well as semiproducts, including copper cake containing PGMs, and cobalt in solution, which were further processed by third parties. In 2007, the Harjavalta refinery produced 34,550 t of nickel products and produced another 20,414 t of products in tolling agreements (MMC Norilsk Nickel, 2009).

On June 28, Noril'sk Nickel acquired 85% of the shares of Tati Nickel Co. Proprietary Ltd. of Botswana. The Government of Botswana owned the remaining 15% in Tati Nickel. Tati Nickel included the Phoenix open pit nickel mine and the Selkirk underground nickel mine. In 2007, Tati Nickel produced 15,129 t of nickel in concentrate (MMC Norilsk Nickel, 2009).

Based on the results of an independent audit conducted in accordance with the standards of the JORC, proven and probable reserves of nickel on the Kola and the Taymyr Peninsulas exceeded 6 Mt. Norilsk Nickel operated four mines on the Kola Peninsula that extracted disseminated sulfide ores containing copper, nickel, and other ore constituents. Norilsk Nickel had ore processing and metallurgical enterprises at both locations, but the refining of PGM concentrates from Norilsk Nickel was outsourced under a tolling agreement to the Krasnoyarsk nonferrous metals plant (MMC Norilsk Nickel, 2007).

Ore production on the Taymyr Peninsula was projected to increase to 18.5 Mt in 2015, with the production of nickel-rich ore [grading 2.5% nickel, 2.25% copper, and 5 to 100 grams per metric ton (g/t) PGM] and cuprous ores (grading 0.2% to 2.5% nickel, 1% to 15% copper, and 5 to 50 g/t PGM) reaching levels of 7.5 Mt and 5.5 Mt, respectively, and of disseminated ores (grading 0.2% to 1.5% nickel, 0.3% to 2% copper, and 2 to 10 g/t PGM) of 5.5 Mt. In 2006, the composition of ore extracted on the Taymyr Peninsula changed with a 180,000-t reduction in the production of nickel-rich ore owing to the decommissioning of facilities and a 220,000-t decrease in output of cuprous ores owing to the renovation of facilities. Output of disseminated ore increased by 139,000 t (MMC Norilsk Nickel, 2007).

The key projects that would enable Norilsk Nickel to achieve its production target of 7.5 Mt/yr of nickel-rich ore on the Taymyr Peninsula were the development of the Skalisty Mine, which would have a total capacity of 3 Mt/yr of ore, and the mining of lower horizons of the Taymyrsky Mine, which would increase total output at Taymrysky to 4 Mt/yr of ore by 2011 (MMC Norilsk Nickel, 2007).

The increase in cuprous ore output on the Taymyr Peninsula to 5.5 Mt would be achieved by the increased mining of cuprous ores at the Oktyabrsky Mine to 3 Mt/yr, which would help to offset the depletion of nickel-rich ore. An expansion of cuprous ore mining by 2.5 Mt/yr was planned at the Komsomolsky Mine, with total projected output at Komsomolsky of 4.3 Mt/yr. Achieving an optimal production of disseminated ore of 5.5 Mt/yr would be achieved by stripping new mining areas at the Komsomolsky, the Oktyabrsky, and the Zapolyarny Mines (MMC Norilsk Nickel, 2007).

Production on the Kola Peninsula was projected to remain at about 7.5 Mt/yr of ore, which would be achieved by commissioning the Severny-Gluboky Mine at its design capacity of 6 Mt/yr by 2012. Production from Severny-Gluboky would offset the decommissioning of the Tsentralnaya open pit (MMC Norilsk Nickel, 2007).

The implementation of Norilsk Nickel's mine development plan would enable the company to maintain stable metal production levels. Increases in base and precious metals production on the Taymyr Peninsula would be achieved by using newly developed technology to upgrade concentration operations and expand the capacity and also by increasing the rate of processing of stored pyrrhotite tailings. On the Kola Peninsula, the modernization of metallurgical operations was primarily aimed at reducing sulfur dioxide emissions (MMC Norilsk Nickel, 2007).

In the Ural Mountains region, Russian nickel enterprises produced nickel from laterite ores. In 2007, Yuzhuralnikel, which was Russia's second ranked nickel producer and a division of steelmaker Mechel OAO, produced 17,140 t of nickel metal (Reuters, 2008). OAO Ufaleynikel, which produced granulated nickel, nickel monoxide, and cobalt metal and oxides, increased nickel production by 2.7% to an estimated 14,100 t compared with 2006 when Ufaleynikel reported producing 13,773 t. OJSC Koks, a company which, like Ufaleynikel, was a part of Industrial Metallurgical Holding, owned 83.64% of the shares of Ufaleynikel (Interfax Russia & CIS Metals and Mining Weekly, 2008c, d). Ufaleynickel, had the capacity to produce 15,000 t/yr of nickel metal products (Reuters, 2008).

RCC planned to invest $160 million to build a nickel production complex in Chelyabinsk in the Ural Mountains region. The first stage was to go into operation in 2009. RCC had started constructing a mine and an ore-enrichment plant at the Kulikovskaya group of nickel and cobalt deposits. The design capacity of the plant was expected to be 7,000 t/yr of nickel metal (Reuters, 2008).

Niobium (Columbium).—Russia's niobium consumption in 2007 was assessed at between 25 and 30 t, but was projected possibly to increase to 500 t by 2010. The country's niobium reserves are located in 22 known deposits. The only enterprise that mined niobium was the Karnasurt mining enterprise, which was subordinate to AO Sevredmet, which mined the Lovozerskoye loparite deposit on the Kola Peninsula. The concentrate was processed at the rare-earth-metals processing plant in Sillamae, Estonia. A Russian development program envisioned processing 12,000 t/yr of loparite ore from Lovozerskoye at the OAO Chepetskiy machinery manufacturing plant, which would produce 3,900 t/yr of titanium dioxide, 873 t/yr of niobium pentoxide, 472 t/yr of neodymium oxide, 310 t/yr of zirconium dioxide, 280 t/yr of lanthanum oxide, 61 t/yr of tantalum pentoxide, and 56 t/yr of praseodymium oxide (Kurkov and Kotova, 2007). The Katuginskoye deposit in Chitinskaya Oblast' was projected to be a significant supplier of niobium after 2010. The largest and most significant prospective source of niobium was the Tomtorskoye deposit on the Taymyr Peninsula in East Siberia, which had an average contained niobium oxide content of 6.71%. The first stage of a planned mining enterprise to develop this deposit was projected to produce 10,000 t/yr of ore; reserves were adequate to maintain production for about 100 years (Kurkov and Kotova, 2007).

Platinum-Group Metals.—In 2007, output at Norilsk Nickel's operations in Russia, which produced more than 95% of the country's PGM, totaled 3,113,000 troy ounces (96.8 t) of palladium and 740,000 troy ounces (23.4 t) of platinum, which was a slight decrease compared with palladium production in 2006, but platinum production remained at the 2006 level. Norilsk Nickel did not project a near-term increase in PGM production at its Russian operations (MMC Norilsk Nickel, 2008).

Norilsk Nickel also produced PGM at its Stillwater Mining Co. in Montana and at Tati Nickel in Botswana, which Norilsk acquired in 2007. Norilsk Nickel had become the owner of a 55.4% stake in Stillwater in 2003, which was the leading producer of PGM in the United States. PGM produced by Stillwater was outsourced for refining to independent precious metals refineries in California and New Jersey. Since 1997, Stillwater Mining also had been processing PGM scrap mainly from recycled autocatalysts. In 2007, Norilsk Nickel's Stillwater operations produced 124,000 troy ounces (3.86 t) of platinum and 413 troy ounces (12.84 t) of palladium and its Tati Nickel operation produced 8,657 troy ounces (269 kilograms) of platinum and 53,571 troy ounces (1.66 t) of palladium (MMC Norilsk Nickel, 2009).

Based on the results of an independent audit conducted in accordance with the standards of the JORC, proven and probable reserves of palladium on the Taymyr Peninsula exceeded 63 million troy ounces (about 2,000 t) and more than 16 million troy ounces of platinum (about 500 t) at a combined grade of 7.54 g/t PGM (MMC Norilsk Nickel, 2007).

Barrick Gold Corp. of Canada estimated that, at the end of 2006, its Fedorova Tundra deposit in the Murmansk region contained measured and indicated resources of 1.1 million troy ounces (about 34 t) of palladium and 300,000 troy ounces (about 9 t) of platinum and inferred resources as of the end of 2006 of 1.3 million troy ounces of palladium (about 40 t) and 300,000 troy ounces (about 9 t) of platinum. Barrick later stated that continued exploration might double the size of the reserves (Interfax Russia & CIS Metals and Mining Weekly, 2009). Barrick planned to mine the deposit to produce concentrate, which would be processed at Norilsk Nickel's Severonikel plant on the Kola Peninsula. Production was scheduled to commence in 2010, with output projected to be 150,000 t/yr of concentrate expected to contain 98 g/t PGM (Interfax Russia & CIS Metals and Mining Weekly, 2007a).

Rare Earths.—Russia consumed about 100 t of rare earths in 2007. Reserves of rare earths were located in 14 deposits but were being mined only at the Lovozerskoye deposit on the Kola Peninsula. Rare-earth elements make up 32% of the loparite ore (Kurkov and Kotova, 2007). The richest source of rare-earth ores in Russia is the Tomtorskoye deposit on the Taymyr Peninsula. The rare earths of the cerium and samarium subgroups make up 11.96% of the ore, and those of the yttrium subgroup make up 0.84%. The yttrium oxide content of the ore is between 0.5% and 0.8%. An economic assessment of this deposit determined that it would be economic to mine even at the small production level of 100,000 t/yr of ore (Kurkov and Kotova, 2007).

Rhenium.—Future Russian consumption of rhenium was projected to be between 2 and 5 t/yr. Rhenium reserves are hosted in three molybdenum deposits—the Agaskyrskoye and the Sorskoye deposits in the Khakasiya Republic, and the Malo-Oynogorskoye deposit in the Buryatiya Republic (Kurkov and Kotova, 2007).

Scandium.—In 2007, Russia was not producing scandium. Russia's annual demand for scandium after 2010 was estimated to be in the range of from 1.6 to 2 t. Scandium reserves are located in four deposits, one of which is a bauxite deposit in Sverdlovsk Oblast' and three of which are tin deposits in Chitinskaya Oblast' and Khabarovsk Kray. The country has many other potential sources of scandium, which include production as a byproduct of uranium ore and recovery from wastes produced during the magnetic separation of iron-vanadium ores (Kurkov and Kotova, 2007).

Tantalum.—Russian tantalum consumption in 2007 was about 10 t/yr, but could be 100 t/yr by 2010. Reserves of tantalum are contained in 21 deposits and almost all also contain niobium. Tantalum was being mined from the Lovozerskoye deposit on the Kola Peninsula. Tantalum mining at the Etykinskoye deposit of the Zabaykal'skiy mining and beneficiation complex had practically ceased. It would not likely be possible to satisfy future Russian tantalum demand by mining these two deposits. The Lovozerskoye and the Zabaykal'skiy mining enterprises were either on the verge of being unprofitable or were unprofitable. Russia did not have any enterprises that produced metallic tantalum and depended on tantalum metal that had been produced at the Ulba plant in Kazakhstan. The most prospective deposit for tantalum development was considered to be the Katuginskoye deposit in the Chitinskaya Oblast' (Kurkov and Kotova, 2007).

Titanium.—Russia's VSMPO-Avisma, which was the world's leading producer of milled titanium products, produced titanium sponge and rolled titanium metal; in 2007, it increased production of titanium sponge by 6% to 34,200 t. According to its strategic development plan for 2007 to 2012, the company planned to invest $300 million to increase titanium sponge production to 44,000 t/yr in 2012, and the majority of the funds would be invested before 2009 (Interfax Russia & CIS Metals and Mining Weekly, 2008f). Demand for titanium metal in Russia was forecast to increase to 10,000 t in 2012 from 5,400 t in 2006 owing in part to increased demand from the expanding Russian aircraft industry. The Russian aircraft industry was projected to consume 6,500 t by 2012 compared with 3,500 t in 2006. The state-owned weapons exporter Rosoboronexport owned 66% of VSMPO-Avisma (Interfax Russia & CIS Metals and Mining Weekly, 2007q, r).

Vanadium.—The Siberian Mining and Metallurgical Co. acquired 79% of the shares of Vanadiy-Tula, which produced about 9,000 t/yr of ferrovanadium. Vanadiy-Tula stated that it possessed between 15% and 18% of the world's ferrovanadium market and 70% of Russia's market (Metall Ukrainy, 2008b).

Zirconium.—Russia reportedly ranked fourth in the world in zirconium reserves after Australia, the United Arab Emirates, and Ukraine, with about 8.5% of world reserves. Reserves of zirconium termed economic under the reserve classification system that had been used in the Soviet Union and then Russia (balansovye zapasy) were located in 11 deposits, of which 6 were placer deposits and the remainder were hard rock deposits. About 70% of the country's zirconium reserves are located in Siberia. Up until 2010, placer deposits could be mined to provide zirconium; development of hard rock deposits would begin after 2010 (Kurkov and Kotova, 2007).

The country's only domestic source of zirconium production was 3,000 to 5,000 t/yr of baddeleyite concentrate produced as a byproduct from apatite-magnetite ores mined at the Kovdor mining and beneficiation complex on the Kola Peninsula. The concentrate had a low zirconium content and the extraction rate of the metal was also quite low (about 17%). The concentrate was exported mainly to Japan and Norway (Shevelyev and Tokhtas'yev, 2006; Kurkov and Kotova, 2007).

The country's atomic energy industry's demand for zirconium was 100 t in 2002, but was projected to increase to 1,400 t in 2010. The most prospective hard rock deposit was deemed to be the Katuginskoye complex rare-earth–chryolite–zirconium–niobium–tantalum deposit in the north of Chitinskaya Oblast' in the Baikal-Amur Mainline (BAM) railroad region. This deposit was considered adequate to supply fully the atomic energy industry's needs for zirconium as well as niobium and tantalum and to supply partially its demand for yttrium. Mining of this deposit, if it were to be developed, would not take place until 2010 (Kurkov and Kotova, 2007).

Industrial Minerals

Barite.—In 2007, Russian barite production did not exceed 100,000 t, but Russia's barite consumption was assessed to be between 350,000 and 400,000 t and was projected to increase to between 800,000 and 900,000 t/yr by 2010. The country's main barite producer was the Salarinskiy lead-zinc mining and beneficiation complex, which was mining the Kvartsitovaya Sopka deposit and was supplying 10% of the country's barite consumption. Barite from Salarinskiy was produced as a byproduct of lead-zinc ore mining as barite made up less than 15% of the content of the ore. Russia's barite resources were assessed to be 165.3 Mt, of which 30 Mt was assessed to be economic reserves (Gerasimov, 2007).

Diamond.—Russia was the world's leading diamond mining country and almost all of its output was mined by ALROSA Co. Ltd., which had its main operation in the Sakha (Yakutiya) Republic in East Siberia (Kimberley Process, 2009). ALROSA was one of the world's leading companies in the field of diamond exploration, diamond mining, sales of rough diamond, and diamond processing, and it accounted for 97% of all Russia's diamond production. Its share of global rough diamond production was 25%. ALROSA stated that it had sufficient reserves to maintain its current level of production for 50 years (ALROSA Co. Ltd., 2009b).

The shareholders of ALROSA were the Ministry for Property Relations of the Russian Federation (47.6265%); the Ministry for Management of the State-Owned Property of the Sakha (Yakutiya) Republic (32.0%); Administrations of the districts of the Sakha (Yakutiya) Republic (8.0005%); and other legal entities and individuals (12.373%) (ALROSA Co. Ltd., 2009a).

In 2007, diamond mine production remained at about its 2006 level of 38 million carats. In 2007, ALROSA's production of diamond, in terms of value, increased by 0.2% compared with that of 2006 to $1,798.1 million and the sale of diamond decreased by 3.4% compared with that of 2006 to $2,285.7 million. In 2007, ALROSA employed almost 35,700 people (ALROSA Co. Ltd., 2008).

According to the company's annual report, one of ALROSA's top priorities in 2007 was expanding the company's mineral resources. ALROSA continued to develop cooperation with Angola and, in 2007, signed an agreement with Empresa de Diamantes de Angola (Endiama) (which was Angola's state-owned diamond mining company) on joint prospecting in an area of 3,000 square kilometers in the Cacolo municipality. As part of expanding the company's activities outside Russia, in 2007, ALROSA signed an agreement on cooperation with the Government of Armenia for diamond and jewelry manufacturing, providing for exchanges of information, and coordinating to strengthen the competitive positions of Russian and Armenian diamond manufacturers in the world market (ALROSA Co. Ltd., 2008).

Gemstones (Amber).—The Kaliningrad Amber enterprise, which is located in the Kaliningrad region where 95% of the world's amber reserves are located, was the only commercial amber producer in the region. In 2003, the Amber enterprise declared bankruptcy but completely paid off its debts in May 2007. Almost all net profits earned in 2006 went to paying off its debts. In the fall of 2006, it was agreed that ALROSA Co. Ltd., which was the country's monopoly diamond producer, and the Kaliningrad regional authorities would become joint owners of Kaliningrad Amber, which consisted of a mining enterprise and jewelry firm. Investment in Kaliningrad Amber would enable it to increase production to between 200 and 250 t/yr (Interfax Russia & CIS Metals and Mining Weekly, 2007b).

Magnesium Compounds.—The Magnezit Group was Russia's leading magnesite producer and had a 67% share of the

Russian refractories market and a 60% share of the CIS market. The Group's holdings included the Kyshtym refractories plant, the Magnazit Works, Sibirsky Magnezit, two plants in China, and two sales divisions. The Magnezit Group operated the Karagayskiy open pit mine and the Magnezitovaya underground mine. The Karagayskiy open pit was near depletion, and development of the Yelnichnoye deposit within the Satkinaya group of deposits was underway to replace production from Karagayskiy. The Magnezit Group also had a license to develop the Goluboye deposit in the Krasnoyarsk region, which reportedly has explored reserves of 15.5 Mt. A planned mine would have the capacity to produce 200,000 t/yr of raw magnesite and was scheduled to achieve capacity production in 2008. Planning was underway for construction of a plant that would have the capacity to produce 95,000 t/yr of roasted magnesite from this ore; the plant was scheduled to be completed in 2009. The Magnezit Group reportedly had 150 Mt of proven reserves in its deposits in the Chelyabinsk region (Interfax Russia & CIS Metals and Mining Weekly, 2007c).

Phosphate Rock.—In Russia, the major source of phosphate raw material ore is the apatite reserves in the Khibiny massif and the Kovdor deposit on the Kola Peninsula. The Khibiny apatite-nepheline ores contain about 90% of the country's apatite reserves and have a P_2O_5 content of 12% to 16%; the Kovdor ores contain about 6% of the country's reserves and have a P_2O_5 content of between 6% and 7% (Brylyakov and others, 2007).

The OAO Apatit complex (a part of FosAGro Holding), which mined the Khibiny massif, produced about 8.5 Mt/yr of apatite and nepheline concentrates and employed about 12,500 people. Beneficiation of apatite-nepheline ore from the Khibiny massif took place at two beneficiation plants, which produced two types of apatite concentrate—"standard," which contains not less than 39% P_2O_5, and "super," which contains 40% P_2O_5 and less than 0.02% titanium dioxide. OAO Apatit consisted of four mining enterprises—the Kirovsky, the Rasvumshorrsky, the Tsentralny, and the Votochny. About 54% of ore from Khibiny was mined from open pits, and the remaining 46% was mined from underground mines; in the future, extraction would be switching to underground mining because of depleting reserves. Reserves at Khibiny are sufficient to sustain production through 2050. The Kovdor mining and beneficiation complex had an open pit with the capacity to mine between 10 and 12 Mt/yr of ore to produce 1.9 Mt of apatite concentrate (Brylyakov and others, 2007; Grigoryiev, 2007).

Another source of phosphate raw material was the more than 30 sedimentary phosphate rock deposits in the European part of Russia; this raw material could be processed into phosphate flour. These deposits were economic to mine only if all byproducts are fully used, including dolomite, glauconite, and quartz (Brylyakov and others, 2007).

Sedimentary phosphate rock from deposits in Bryansk Oblast' (Polpinskoye deposit), Kirov Oblast' (Vyatsko-Kamskoye deposit), and Moscow Oblast' (Yegor'yevskoye deposit) can be processed into phosphate flour. Although Russia once had the capacity to produce 4.7 Mt/yr of phosphate flour containing 1 Mt of P_2O_5 from these sedimentary phosphate rock deposits, since 2000, production had practically ceased; in 2006, production was about 12,800 t of P_2O_5. The country's demand for phosphate flour from these sedimentary phosphate rock deposits is in the range of from 1.1 to 2.6 Mt/yr of P_2O_5 (Brylyakov and others, 2007).

Sedimentary phosphate rock containing about 6% P_2O_5 from the Baltic basin was mined primarily by the OAO Fosforit enterprise from the Kingisepp deposit, which produced a phosphate flour with a 28% P_2O_5 content. Fosforit was constructed with a capacity to mine 7 Mt/yr of ore, but owing to the lack of demand in the world market for phosphate flour, it had mothballed about one-half of its production capacity. The remaining phosphate flour was produced for use domestically to produce complex fertilizers. Since 2005, Fosforit had been processing about 2.5 Mt/yr of ore containing 6.8% P_2O_5 and producing 380,000 t/yr of phosphate flour (Brylyakov and others, 2007).

Potash.—Russia's two major potash producers—OAO Silvinit and OAO Uralkaliy—both mined potash from the Verkhnekamsk deposit in the Ural Mountains region. The deposit contains potassium-magnesium salts and was reportedly the second largest potash deposit in the world.

Silvinit was Russia's leading potash producing enterprise. The enterprise produced about 10% of the world's output of potassium fertilizers and, in terms of production capacity, was the world's fifth ranked company. Silvinit consisted of three mining directorates with facilities that could engage in a full cycle of mining raw material and producing fertilizers. In 2007, Silvinit produced 5.46 Mt of potassium chloride, which was the largest amount ever produced by a Russian enterprise. Silvinit was also a major producer of table and technical salts, with output of about 1 Mt/yr of various salts. In 2006, Silvinit successfully fulfilled its Plus Million program, which it had adopted in 2004 to increase the volume of output to 5 Mt/yr of potassium chloride, and began a new Plus Million program to increase output to 6 Mt in 2009 (Sabirov, 2008).

Uralkaliy was one of the five leading potash producers in the world and produced about 13% of the world's potash fertilizer output. Its main product was potassium chloride. Potash mined at Uralkaliy was used in direct application as fertilizer and also in the production of compound fertilizers. Uralkaliy exported 90% of its output (Dy'yakov, 2008).

Uralkaliy together with Production Almagamation (PA) Belaruskali (which was the major potash enterprise in Belarus) formed the Belarussian potash company in 2005; this company became the world's leading potash exporter and controlled 34% of the world's potassium fertilizer exports. In 2005, potash production at Uralkaliy increased to 5.417 Mt of potassium chloride, but in 2006, one of Uralkaliy's three mines was closed because of flooding, which resulted in a reduction in output. To compensate for the loss of output, Belaruskali began a program to increase production at the remaining two mines and to modernize the beneficiation plant. Plans were underway by Uralkaliy to develop a mine at the Ust'Yayvinsskiy sector at the Verkhnekamsk deposit, which was planned to go into operation by 2015. Uralkaliy planned to raise output of potassium chloride to 7 Mt by 2011, which would necessitate increasing ore output to 27 Mt/yr from 19 Mt/yr (Dy'yakov, 2008).

Salt.—Russia reportedly has abundant salt reserves, which were assessed to be about 49 billion metric tons. However, in 2007, the country produced only about an estimated 2.2 Mt of salt, which was far less than was produced in other large countries, such as Canada, China, India, and the United States. Russia imported more than 17% of its salt consumption. The Artemsol' enterprise in Ukraine exported 870,000 t of table salt to Russia in 2005; another major supplier of salt to Russia was the Mozyrsol' enterprise in Belarus. The main obstacle to Russia developing its salt resources for domestic consumption was the cost of shipping salt over long distances. Owing to the small profit margin in salt, it must be marketed fairly close to the region in which it is mined. Table salt production took place at seven enterprises, each of which had a relatively concentrated market. The leading Russian enterprise that produced table salt was Bassol', which supplied 70% of the country's needs. Another significant producer was OAO Silvinit, which developed the reserves of the Verkhnekamsk deposit of potash-magnesium salts; it was also one of the country's leading producers of table and technical salt with output in 2006 of 1.08 Mt. Silvinit produced one-third of the country's technical salt.

Mineral Fuels and Related Materials

The country's energy sector, which was a main determinant of the country's economy, was on the verge of a significant structural change owing in part to projected changes in the country's energy balance caused by the changing relative prices for fuels. In 2005, of the country's total energy generation, natural gas accounted for more than 40%; coal, about 20%; hydroelectric power, 20%; nuclear power, 15%; and oil, 3%. The Government had placed an emphasis on the future development of domestic electric energy generation capacity through the development of coal, hydroelectric, and nuclear sources for generating electric power to meet the large and increasing domestic demand. In the process, the role of natural gas, which was the main source of fuel for electric energy generation, would be diminished and role of coal would be increased (Linyev and others, 2007; Shchadov, 2007).

Coal.—Out of a total of 314.5 Mt of coal mined in 2007, 109.2 Mt was mined underground and 205.3 Mt was mined from open pits. Russia ranked fifth in the world in the total volume of coal mined following China, the United States, India, and Australia. The maximum amount of coal mined in Russia was 425 Mt in 1988 and the minimum amount was 232 Mt mined in 1998. Since 1999, the country had experienced growth in coal output every year. However, almost all growth in coal output was of higher quality coal, which was exported. Domestic coal consumption, however, remained at about the same level, and consumption of coal for energy generation decreased, in part because of warmer winters in Russia and the larger volumes of water in rivers and reservoirs, which increased hydroelectric output. Coal was consumed domestically primarily at powerplants and coal chemical plants.

In 2007, the number of employees at coal mining enterprises and coal preparation plants was 154,400, which was 7,600 people less than in 2006. The number of fatalities from mine accidents rose from 85 in 2006 to 242 in 2007 owing primarily to three major mining accidents, which claimed 159 lives. Two of the accidents took place at the Ul'yanovskaya and the Yubileynaya Mines in the Kuznetsk basin and at the Komsomol'skaya Mine in the Vorkuta region (Tarazanov, 2008).

In 2007, Russian coal exports increased by 6.9% (6.1 Mt) to 93.4 Mt. More than 90% of coal exported went to countries outside of the CIS. The increase in exported coal put a strain on the railroad system (Tarazanov, 2008).

Economic (balansobye) reserves in the categories A, B, and C1, which are classifications according to the reserve classification system that was in use in the Soviet Union, were reportedly 200 Gt, of which brown coal accounted for 53% of reserves; hard (bituminous) coal, 44%; and anthracite, 3.5%. Reserves at operating mining enterprises were about 19 Gt, of which metallurgical coal accounted for about 4 Gt. Coal reserves in Russia were considered to be adequate for a period of 600 years. As of January 1, 2007, Russia had in operation 240 coal mining enterprises, of which 97 were underground coal mining enterprises and 143 were open pit mining enterprises (Tarazanov, 2008).

The Kuznetsk basin (Kuzbas) was the country's main producing region and was expected to be so in the future. Reserves in the Kuzbas contained all grades of hard coal and were suitable for use in energy generation and coke production. The Kuzbas accounted for more than 55% of Russia's coal output and provided 83% of the metallurgical coal consumed domestically. In 2007, coal production increased in the Kuznetsk basin by 4% (7.4 Mt) compared with that of 2006 to 181.8 Mt. Coal production also increased in the Donetsk basin by 5% (362,000 t) to 7.4 Mt, and in the Kansk Achinsk basin, by 0.2% (60,000) t to 37.8 Mt. Coal production decreased in the Pechora basin by 8% (1.1 Mt) to 12.8 Mt (Shchadov, 2007; Tarazanov, 2008).

Revised projections by the Russian Government in a moderate case scenario called for Russian coal production to increase to 410 Mt by 2015 and 470 Mt by 2020. Earlier projections in the moderate scenario called for coal production to increase to 375 Mt by 2020 (Shchadov, 2007). In 2006, 14 coal mining enterprises with a total combined capacity of 14 Mt/yr were in the stage of design and construction, and 4 beneficiation plants with a combined capacity of 4 Mt/yr were also in this stage. Growth in coal production would likely come from the eastern part of the country from the large Kansk Achinsk brown coal basin; the Pechora basin, which has significant reserves of metallurgical coal; and the South Yakutiya basin. Coal production in the current large producing areas in the European part of Russia and the Ural Mountains region was projected to stabilize but, under favorable circumstances, could increase by 30 Mt/yr (Shchadov, 2007).

Improving coal quality through washing and employing technologies to lower the moisture content and nonhydrocarbon mineral content of coal would be an important factor in increasing the role of coal in the country's energy balance and in protecting the environment. Russia's electric power stations consumed coal, it was claimed, with a lower calorific value than any other country of the world. The ash content of coal consumed at Russia's power stations was as high as 20%, which did not include coal obtained from the Ekibaztus coal basin in

Kazakhstan where the ash content exceeded 40%. The average moisture content of coal used at Russian electric powerplants was 23%. Coal that Russia exported, however, had an average ash content of 11% and a moisture content of 8%. In the ecological sphere, the Government was calling for implementing measures to capture and use emissions from coal beneficiation as well as coalbed methane (Shchadov, 2007).

Natural Gas.—Russia was the world's leading natural gas producer and exporter and has the world's largest natural gas reserves, with 1,680 trillion cubic feet (almost 47.6 trillion cubic meters) of reserves. This is almost twice the size of the reserves in Iran, which has the next largest reserves (U.S. Energy Information Administration, 2007b). In 2007, natural gas production decreased by about 0.8% compared with that of 2006 to 651 billion cubic meters. Almost 90% of the country's natural gas was produced in the Ndym-Pur-Taz (NPT) region in northern West Siberia. (The name of the region was derived from the names of three rivers that border this region.) The NPT region hosts three massive Russian gasfields (the Medvezh'ye, the Urengoy, and the Yamburg), which had been the country's main producers and had supplied about 70% of the country's gas production. These three fields were in decline, however, as reserves were being depleted. To keep up with the growth in the Russian economy and the country's long-term export commitments to Europe to increase gas output, Russia was expected to have to incur greater costs to develop fields further north and to the east in an even more difficult physical environment than in the NPT region. A main target for future development would be the Yamal Peninsula, where large reserves were discovered in several fields (Sagers, 2007). The newly developed Zapolyarnoye field on the Yamal Peninsula was a major contributor to replacing decreasing production from Gazprom's large older fields, where reserves were more than 50% depleted (U.S. Energy Information Administration, 2008b).

OAO Gazprom, which was a joint stock company in which the Government was the largest stakeholder (50.002% controlling share), produced 83.9% of the country's gas output in 2006 and controlled and operated the country's natural gas trunk pipeline network. Gazprom was Russia's leading foreign currency earner and paid about 25% of the country's total federal tax revenues. Although Gazprom projected that it would increase natural gas output between 2008 and 2030, most increases in natural gas output were projected to come from independent gas companies, such as Itera, Northgaz, and Novatek, which although blocked from the export market, had found a niche supplying the domestic market (Sagers, 2007; U.S. Energy Information Administration, 2007b).

Gazprom owned the world's largest gas transmission system, the Unified Gas Supply System of Russia, which extended for 156,900 kilometers and through which it exported gas to 32 countries. In 2006, Gazprom sold 101 billion cubic meters to the CIS and the Baltic States and 161.5 billion cubic meters of gas to other European countries. In 2005, construction began of the Nord Stream pipeline; this pipeline would substantially enhance the flexibility of Gazprom's supply routes to Europe. Gazprom was preparing to develop the Barents Sea Shtokman offshore field; 50% of the gas from this field would be exported as liquefied natural gas (LNG) to Canada and a portion was to serve as a resource base for Russian gas exports to Europe, which would be transported by way of the Nord Stream pipeline (U.S. Energy Information Administration, 2008b). In 2006, Gazprom and ENI S.p.A. of Italy signed a memorandum of understanding regarding construction of the South Stream gas pipeline, which would be laid on the bottom of the Black Sea from Russia's coast to the coast of Bulgaria. Priorities for Gazprom were the development of gasfields on the Arctic continental shelf, in East Siberia, and on the Yamal Peninsula.

Russian statistics state that about 25% of associated gas is flared, although the percentage is not exact because of a lack of metering equipment to measure flaring. The Government planned to increase associated natural gas production by increasing the recovery of associated gas. Government legislation had been introduced to increase fines, beginning in January 2009, for flaring more than 15% of the total associated gas produced. In 2007, Russia set limits for flaring at 25% of the total associated gas output and penalties for violations were small. The Government envisioned reducing flaring to 5% by 2011 (U.S. Energy Information Administration, 2008b).

Petroleum.—In 2007, Russia's production of crude oil increased by about 2.2% to 491 Mt and made Russia the world's second ranked oil producer and the world's second ranked exporting nation. Since 2004, however, the rate of growth in Russian oil production had leveled off to somewhat above 2% annually, which had called into question the long-term growth potential for Russia's oil. According to data in the BP Statistical Review of Energy 2006, Russia's proven reserves of oil and gas condensate at the end of 2005 totaled 10.2 Gt, which yielded a reserves-to-production ratio of 21.4 years. Reserves in fields that were in operation could be depleted within a decade, however. In 2006, additions to reserves exceeded production. Some Russia officials believe that Russia has a large resource base that could serve to replenish oil reserves if adequate investment is devoted to exploration (Kryukov and Moe, 2007).

Most of Russia's reserves are located in West Siberia between the Ural Mountains and the Central Siberian Plateau. Little exploration had taken place in East Siberia where only four or five oilfields and gasfields had been discovered despite the promise of large resources. For the coming decade, Russian oil production was projected to grow at an annual rate of about 1.5% to 2.5% owing in part to increased output from oil development on Sakhalin Island, coupled with a slowdown in growth from the major mature oilfields in West Siberia, a number of which had passed peak production. New fields that were under development would likely produce almost all of Russia's increase in annual oil output in the next 5 years and would probably produce more than one-half of the country's oil by 2020. These new fields would help stem production losses at older fields. These fields were to be developed in projects that included OAO Lukoil Oil Co./ConocoPhillips Co.'s TimanPechora project; OAO Rosneft Oil Co./OAO Gazprom's offshore Prirazlomnoye project; Rosneft's Vankorskoye and Komsomolskoye development projects on Sakhalin Island; and Shell Joint Venture's West Salymskoye project (U.S. Energy Information Administration, 2007c).

Uranium.—Russian uranium production was controlled by the Corporation TVEL. TVEL supplied the entire fuel requirement to 73 nuclear powerplants in Russia and in 13 countries (which included Armenia, Bulgaria, China, the Czech Republic, Finland, Hungary, Lithuania, Slovakia, and Ukraine), to 30 research reactors in Russia and abroad, and to ship-propulsion reactors of the Russian fleet. TVEL held 17% of the world's nuclear fuel market. It included enterprises that mine and process uranium (JSC Dalur in the Kurgan region, JSC Khiagda in the Republic of Buryatiya, and JSC Priargunsky Industrial Mining and Chemical Union in the Chita region). Priargunsky mined uranium by underground methods, and the other two enterprises employed in situ leaching. The Priargunsky was among the five leading uranium mining enterprises in the world. TVEL also included enterprises that produced component parts and fuel assemblies. These enterprises included Chepetsky Mechanical Plant (Glazov, Udmurtiya Republic), Mashinostroitelny Zavod (Electrostal, Moscow region), and Novosibirsk Chemical Concentrates Plant (Novosibirsk). TVEL employed a total of about 40,000 people (Corporation TVEL, 2007).

In 2006, under an initiative launched by the Russian President, a course was set for increasing nuclear power generation's share to 25% of the country's energy generation by 2030, which would involve building of up to 40 new nuclear reactors in Russia. During 2006, the main processing complex at the Dalur mining and ore beneficiation plant was commissioned, which significantly increased ore processing efficiency and capacity (Corporation TVEL, 2007).

Priargunsky could increase uranium production by more than 50% to 5,000 t/yr by 2014-15. Plans called for Priargunsky to develop the sixth and eighth mines. The sixth mine would be the main source of uranium and was scheduled to be producing 1,000 t/yr by 2015, and the eighth mine, 800 t/yr. With production from these two mines, Priargunsky could produce 5,000 t/yr. It would require considerable investment to commission these new mines and also to implement associated measures to protect the environment (Interfax Russia & CIS Metals and Mining Weekly, 2007e).

Russia established the Joint Stock Company (JSC) Uranium Mining Co. (UMC), which received state registration on November 20, 2006, to consolidate its uranium mining assets in Russia and abroad. UMC was established for the purpose of consolidating financial, industrial, and natural resources to increase mining and reprocessing of natural uranium to meet the growing demands of the Russian nuclear industry. Two leading nuclear Russian companies, JSC Tenex and TVEL, became founders with equal shareholdings. UMC planned to operate in several areas, which would include development of current deposits and prospecting for uranium and creating joint uranium mining companies in the CIS and other countries. UMC's activity was to be carried out in several stages. The first stage was to be for strategic development planning, the second stage was for the transfer of uranium mining enterprises' shares for asset management, and the third stage was for the transfer of mining assets to UMC. UMC planned to increase uranium mining to 28,800 t/yr by 2020. It was projected that Priargunsky would mine 5,000 t/yr; Khiagda, 2,000 t/yr; and Dalur, 1,000 t/yr. The Elkonsky group of deposits would be developed to provide 5,000 t/yr. The remainder was planned to be mined at new uranium deposits in the Chita region and the Republic of Buryatia, as well as at new joint ventures abroad.

According to Russia's "Federal Programme of Development of Nuclear Industry and Nuclear Power Complex of Russia for 2007-2009," nuclear power capacity was expected to increase by 3 gigawatts each year through 2015. The country's total demand for uranium, including uranium for export, was forecasted to grow to 36,000 t/yr by 2020.

Russia's reportedly had 615,000 t of discovered uranium reserves and prospective resources of 830,000 t. The main deposits are concentrated in the Elkonsky, Streltsovsky, Vitimsky, and the Zauralsky regions. Not only Russian deposits, however, but also deposits of such other countries as Kazakhstan, Ukraine, and Uzbekistan, were planned to be used to meet Russia's demand for uranium (Corporation TVEL, 2009).

Reserves and Resources

More than 20,000 mineral deposits had been discovered in Russia, of which about 40% was in commercial production. From 1992 to 2003, there was a sharp reduction in the amount of geologic exploration, but this trend was reversed in 2004. Russia reportedly had adequate mineral reserves to meet the country's current metal consumption needs except for chromite, lead, manganese, molybdenum, and tungsten, although the time period for which these reserves would be adequate was not specified. However, the average ore grade of many of the metallic ores, which include bauxite, copper porphyries, tin, tungsten, and others, was lower than in other producing countries. In the past 20 years, the average metal content of ores had decreased by between 30% and 50%, and the gold and iron content in ores, by 25%. The percentage of ores and coal classified as difficult to beneficiate had increased from 15% to 40%. A large percentage of reserves classified as economic (balansovye) according to the reserve classification system used in the Soviet Union and then in Russia would be reclassified as subeconomic resources if they were evaluated based on market economy criteria. Reportedly, 49% of tin, 34% of lead, and from 15% to 30% of apatite, coal, copper, and titanium reserves would have to be reclassified as subeconomic resources (Chanturiya, 2007).

Basic gas and oil exploration expenditures in 2008 were to be directed at regions of East Siberia, the Sakha (Yakutiya) Republic, and Russia's continental Arctic shelf. Expeditions conducted in 2005 and 2007 in the Arctic led the Russian Ministry of Natural Resources to conclude that the Lomonosov range of the shelf should be included in Russia's economic zone. Russia was preparing documentation to submit its claim to the appropriate international organizations. Among the most notable discoveries was the Central Astrakhan gas condensate deposit, which reportedly had about 1.26 billion cubic meters of gas; the Angoaro-Lenskoye deposit in Irkutsk Oblast, with reserves of 1.1 billion cubic meters of gas; and the Severo-Komar'inskoye and the Kosukhinkoye oil deposits in the south of Tyumen' Oblast', which have reserves of 19.7 Mt and 18 Mt, respectively (Ekonomika i Zhizn', 2007).

Norilsk Nickel signed an exploration agreement with Rio Tinto Group in 2006 for the exploration and subsequent development of deposits in the Far East and Siberian regions of the country and with BHP Billiton for exploration in West Siberia and the northwestern regions of the country (MMC Norilsk Nickel, 2007).

Outlook

The mainstay of Russia's mineral sector and economy for the coming decade is expected to be the oil and gas sector, where production is projected to increase, although at a lower rate of growth than in the preceding decade because of depleting reserves and a lack of adequate investment. Nevertheless, a continuation of high energy prices would enable Russia to continue its high rate of economic growth based on revenues from oil and gas exports. In Russia's nonfuel mineral production sectors, Russia's Economic and Trade Ministry projects that output of nonferrous metals could increase by as much as 13% by 2010 compared with that of 2006. This scenario is predicated on a significant growth in the aluminum industry through projects underway to upgrade existing production capacity and to construct a new aluminum smelter. New copper mines are being developed in the Ural Mountains region, which will provide for an increase in copper production of between 2% and 3% per year; the construction of a zinc plant in the Ural Mountains region will increase zinc output. Increases were also projected for nickel production (Interfax Russia & CIS Metals and Mining Weekly, 2007l).

In the Russian metallurgical industry, only about one-half of the technological processes used in production are on the level of those used in industrially developed countries. This has had the negative effect of requiring above-average expenditures compared with those of industrially developed countries to produce goods, thereby affecting the competitiveness of the products produced. For the Russian metallurgical sector to remain competitive on the world market, it would need to develop resource saving technologies, organize new types of production, and develop more high-value-added products (Parkhomenko, 2007).

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TABLE 1

RUSSIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
METALS						
Aluminum:						
Ore and concentrate:						
Alumina	thousand metric tons	3,230	3,269	3,259	3,265	3,300 [e]
Bauxite		5,441,800 [r]	6,017,600 [r]	6,409,300 [r]	6,399,200 [r]	6,777,000
Nepheline concentrate, 25% to 30%[e]		1,014,279 [r, 2]	1,023,257 [r, 2]	1,000,000	1,000,000	1,000,000
Metal, smelter, primary		3,478,057	3,591,747	3,647,072	3,717,907	3,955,417
Antimony, mine output, recoverable Sb content[e]		2,000	3,000	3,000	3,500	3,500
Arsenic, white[e]		870 [r]	1,500	1,500	1,800 [r]	1,500
Bismuth:[e]						
Mine output, Bi content		23 [r]	20 [r]	19 [r]	17 [r]	19
Metal, refined		10	10	10	11	12
Cadmium, metal, smelter		629 [r]	532 [r]	621 [r]	690 [r]	810
Chromium, chrome ore, marketable		116,455	320,200	772,000	966,065 [r]	776,681
Cobalt:[e]						
Mine output, recoverable Co content		6,100 [r]	6,000 [r]	6,300 [r]	6,300 [r]	6,300
Metal, refined		4,900 [r]	4,800 [r]	5,000 [r]	5,000 [r]	3,800
Copper:						
Ore, recoverable Cu content[e]		650,000 [r]	630,000 [r]	640,000 [r]	739,000 [r]	820,000
Metal:						
Blister, smelter:[e]						
Primary		662,000 [r]	662,000	696,000 [r]	635,000 [r]	650,000
Secondary		180,000 [r]	257,000	262,000 [r]	312,000 [r]	290,000
Total		842,000 [r]	919,000	958,000 [r]	947,000 [r]	940,000
Refined:						
Primary		662,000 [r, e]	682,000 [r]	684,000 [r]	635,000 [r]	650,000
Secondary		18,000 [e]	237,000 [r]	249,000 [r]	312,000 [r]	289,000
Total		680,000 [e]	919,000	933,000	947,000 [r]	939,000
Gallium[e]		10	9	10	11	11
Gold:						
Mine output, Au content	kilograms	170,068	163,148	164,186 [r]	159,340	156,912
Secondary recovery	do.	6,835	4,844	4,884	4,981	5,867

See footnotes at end of table.

TABLE 1—Continued
RUSSIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
METALS—Continued						
Indium[e]		10	11	12	12	12
Iron and steel:						
Iron ore:						
Gross weight		91,759,800	96,980,000	96,764,400	102,000,000	105,000,000 [e]
Fe content, 55% to 63%[e]		53,000,000	56,200,000	56,100,000	59,100,000	60,800,000
Metal:						
Pig iron		48,368,000	50,426,700	49,175,000	51,683,000	51,523,000
Direct-reduced iron[e]		2,900,000	3,140,000	3,340,000	3,340,000	4,000,000
Ferroalloys:[e]						
Blast furnace:						
Ferromanganese		101,000	108,000	108,000	125,000	120,000
Ferrophosphorus		3,500	3,500	3,500	3,500	3,500
Spiegeleisen		7,000	7,000	7,000	7,000	7,000
Electric furnace:						
Ferrochromium		357,000 [2]	453,700 [2]	578,000 [2]	600,000	570,000
Ferrochromiumsilicon		4,000	4,000	4,000	4,000	4,000
Ferronickel, gross weight:[3]						
High-nickel		14,900 [r]	9,640 [r]	12,900 [r]	11,300 [r, 2]	14,000
Other		4,230 [r]	20,900 [r]	8,160 [r]	18,800	20,000
Ferroniobium (ferrcolumbium)		--	--	--	--	80
Ferrosilicon		760,000	721,000	742,000 [2]	882,300 [r, 2]	896,100 [2]
Ferrovanadium		8,000	13,700	12,880 [2]	11,000 [r]	12,000
Silicomanganese		83,000	80,000 [r]	70,000 [r]	70,000 [r]	70,000
Silicon metal		75,000 [r]	75,000 [r]	58,000 [r]	54,500 [r]	54,000
Other		22,000	22,000	22,000	22,000	22,000
Total		1,440,000 [r]	1,520,000 [r]	1,630,000 [r]	1,810,000 [r]	1,790,000
Steel:						
Crude		62,707,600	65,645,600	66,186,200	70,816,000 [r]	72,389,000
Finished, rolled		51,050,000	53,800,000	54,600,000	58,200,000	59,660,000
Pipe		6,102,000	5,990,000	6,673,000	7,898,400 [r]	8,706,000
Lead:[e]						
Mine output, recoverable Pb content		24,000	23,200 [r]	36,400 [r]	34,000 [r]	50,000
Metal, refined, primary and secondary		66,000	70,000	66,000	78,000	94,000
Magnesium:[e]						
Magnesite		1,200,000	1,000,000 [r]	930,000 [r]	1,200,000	1,200,000
Metal, including secondary		43,000	45,000	45,000	35,000 [r]	32,500
Manganese ore:[e]						
Gross weight		67,000 [r]	29,000 [r]	8,000 [r]	12,000 [r]	44,000
Mn content		13,000 [r]	6,000 [r]	1,600 [r]	2,400 [r]	9,000
Mercury[e]		50	50	50	50	50
Molybdenum, in concentrate[e]		2,900	2,900	3,000	3,100	4,100
Nickel:[e]						
Mine output, recoverable Ni content		305,000 [r]	318,000 [r]	329,000 [r]	327,000 [r]	331,000
Matte, for export		3,866	599	700	1,300	1,300 [e]
Nickel products:						
Ferronickel, Ni content[3]		13,500	12,700 [r]	12,600 [r]	14,400 [r]	17,100
Metal		247,000 [r]	246,000 [r]	254,000 [r]	258,000 [r]	249,000
Oxide sinter		6,372 [r, 2]	3,805 [r, 2]	4,075 [r, 2]	2,713 [r, 2]	235 [2]
Chemicals		2,500	3,000	3,000	3,500	3,500
Total		269,000 [r]	266,000 [r]	274,000 [r]	279,000 [r]	270,000
Platinum-group metals:						
Platinum	kilograms	32,700 [r]	28,000 [e]	29,100 [r]	29,100 [r, e]	27,000 [e]
Palladium	do.	92,000 [r]	118,200 [r]	97,400	98,400	96,800 [e]
Other[e]	do.	15,000	15,500 [r]	15,500	15,600	14,500
Total	do.	139,700 [r]	161,700 [r]	142,000	143,100 [r]	138,000 [e]

See footnotes at end of table.

TABLE 1—Continued

RUSSIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
METALS—Continued						
Rhenium[e]	kilograms	1,400	1,400	1,400	1,400	1,500
Selenium		81	85	100	110	110[e]
Silicon[e]		570,000	550,000	525,000	600,000[r]	635,000
Silver:[e]						
Mine output, Ag content	kilograms	700,000	1,276,900[2]	1,350,000[2]	1,250,000[r]	1,200,000
Secondary recovery	do.	250	265	265	265	265
Tin:[e]						
Mine output, recoverable Sn content		2,000	2,500	3,000	3,000	2,500
Metal, smelter:						
Primary		4,100	4,570	5,000	4,980	3,800
Secondary		500	500	500	500	400
Total		4,600	5,070	5,500	5,480	4,200
Titanium sponge[e]		23,000	26,000	29,000	32,000	34,200
Tungsten, concentrate, W content[e]		5,450	5,500	4,400	4,000	4,400
Vanadium, metal[e]		5,800	10,900	15,100	15,100	14,500
Zinc:						
Mine output, recoverable Zn content		159,000	161,700[r]	186,000[r]	178,000[r]	185,000[e]
Metal, smelter, primary and secondary[e]		253,000	240,000	220,000	240,000	260,000
Zirconium, baddeleyite concentrate, averaging 98% ZrO_2[e]		6,600	5,500	6,700[r]	7,500[r]	7,136[2]
INDUSTRIAL MINERALS						
Asbestos, grades I-VI[e]		883,888[r, 2]	923,000[2]	925,000	925,000	925,000
Barite		79,000[r]	63,400[r]	63,400[r]	63,000	63,000[e]
Boron[e]	thousand metric tons	1,000	500	400	400	400
Cement, hydraulic		41,000,000	45,700,000	48,500,000	54,700,000	59,900,000
Clays:[e]						
Bentonite		900,000[r]	870,000[r]	850,000[r]	830,000[r]	800,000
Kaolin concentrate		1,300,000[r]	1,200,000[r]	1,150,000[r]	1,000,000[r]	1,000,000
Diamond:[e]						
Gem	carats	20,000,000	23,700,000[r]	23,000,000	23,400,000[r]	23,300,000
Industrial	do.	13,000,000	15,200,000[r]	15,000,000	15,000,000[r]	15,000,000
Synthetic	do.	80,000,000	80,000,000	80,000,000	80,000,000	80,000,000
Total	do.	113,000,000	119,000,000	118,000,000	118,000,000	118,000,000
Feldspar		121,405[r]	156,391[r]	160,000[r, e]	160,000[r, e]	160,000[e]
Fluorspar, concentrate, 55% to 96.4% CaF_2		170,000[e]	226,400	245,500	210,000[e]	180,000[e]
Germanium		4	3	3	2	2
Graphite		5,700	5,500	5,300	5,100	5,100
Gypsum[e]		1,750,000	2,077,000[2]	2,200,000	2,200,000	2,300,000
Iodine		58,000[r]	105,000[r]	105,000[r, e]	105,000[r, e]	105,000[e]
Lime, industrial and construction[e]		8,000,000	8,200,000[2]	8,200,000	8,200,000	8,200,000
Lithium minerals, unspecified[e]		--[r]	--[r]	--[r]	--[r]	--
Mica[e]		100,000	100,000	100,000	100,000	100,000
Nitrogen, N content of ammonia		9,100,000	9,800,000	10,000,000	10,500,000[2]	10,500,000
Perlite		58,000	56,000	55,000	52,000	52,000
Phosphate rock:[e]						
Gross weight		11,072,600[r, 2]	11,345,300[r, 2]	11,317,400[r, 2]	10,866,000[r, 2]	11,000,000
P_2O_5 content:						
Apatite concentrate, 37% to 39.6%		4,121,000[2]	4,220,000[r]	4,210,000[r]	4,040,000[r]	4,120,000
Sedimentary rock, 19% to 30%		120,000	123,000[r]	123,000[r]	118,000[r]	120,000
Total		4,240,000	4,340,000[r]	4,330,000[r]	4,160,000[r]	4,240,000
Potash, marketable, K_2O equivalent		5,465,000[r]	6,405,000[r]	7,131,000[r]	6,610,000[r]	6,600,000[e]
Salt, all types		2,700,000	2,900,000	2,700,000	2,800,000[r]	2,200,000
Soda ash[e]		2,400,000	2,600,000	2,600,000	2,800,000	2,900,000

See footnotes at end of table.

TABLE 1—Continued
RUSSIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
INDUSTRIAL MINERALS—Continued						
Sulfur:[e]						
Native		50,000	50,000	50,000	50,000	50,000
Pyrites		357,000 [r]	286,000 [r]	304,000 [r]	304,000 [r]	200,000
Byproduct:						
Metallurgy		523,000 [r]	572,000 [r]	640,000 [r]	695,000 [r]	800,000
Natural gas		5,804,700 [r, 2]	5,909,958 [r, 2]	6,301,000 [r, 2]	6,346,000 [r, 2]	6,000,000
Total		6,730,000 [r]	6,820,000 [r]	7,300,000 [r]	7,400,000 [r]	7,050,000
Sulfuric acid		8,800,000	9,200,000	9,500,000	9,500,000	9,652,000 [2]
Talc[e]		130,000 [r]	150,000 [r]	160,000 [r]	160,000 [r]	170,000
Vermiculite[e]		23,000 [r]	21,000 [r]	25,000	25,000	25,000
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Anthracite		7,900,000	7,800,000	8,000,000	18,000,000	18,332,000
Bituminous		269,100,000	203,200,000	195,000,000	215,000,000	218,971,000
Lignite		79,400,000	70,400,000	95,300,000	75,800,000	77,200,000
Total		356,400,000	281,400,000	298,300,000	308,800,000	314,503,000
Coke, 6% moisture content		32,700,000	33,801,000	31,600,000	32,700,000	33,800,000
Natural gas, marketed	million cubic meters	616,450	633,950	635,964	656,230	651,000
Oil shale		1,400,000 [r]	1,300,000 [r]	1,700,000 [r]	1,900,000 [r]	1,900,000
Peat, fuel use		1,000,000	1,500,000	1,600,000	1,300,000	1,300,000
Petroleum:						
Crude in:						
Gravimetric units		412,377,000	458,808,000	469,600,000	480,480,000	491,000,000
Volumetric units[e]	thousand 42-gallon barrels	3,000,000	3,300,000	3,500,000	3,530,000	3,600,000
Refinery products[4]		190,030,000	195,000,000	207,000,000	219,575,000	211,000,000
Uranium:						
U content		3,150	3,223 [r]	3,431 [r]	3,262 [r]	3,413
U_3O_8 content		3,715	3,801 [r]	4,045 [r]	3,847 [r]	3,762

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. do. Ditto. NA Not available. -- Zero.

[1] Table includes data available through February 28, 2009.

[2] Reported figure.

[3] In December 2001, Mechel OAO acquired a 79.9% interest in the South Urals Nickel Plant previously operated by Yuzhuralnikel Combine JSC. The new owner made substantial improvement to the Orsk ferronickel plant and produced a low-iron ferronickel (greater than 85% nickel). Excludes nickel-chromium remelt alloy produced from scrap. The remelt alloy typically has a nickel content of 20% to 50%.

[4] Not distributed by type and therefore not suitable for conversion to volumetric units. Data include all energy and nonenergy products but exclude losses.

TABLE 2

RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Alumina	Achinsk (United Company RUSAL)[3]	Achinsk in East Siberia	900,000
Do.	Bogoslovsk (United Company RUSAL)[3]	Krasnotur'insk	1,050,000
Do.	Boksitogorsk (United Company RUSAL)[3]	European north	200,000
Do.	Pikalyovo (United Company RUSAL)[3]	Pikalyovo	300,000
Do.	Uralsk (United Company RUSAL)[3]	Kamensk-Uralskiy	700,000
Aluminum, primary smelters	Bogoslovsk (United Company RUSAL)[3]	Krasnotur'insk	175,000
Do.	Bratsk (United Company RUSAL)[3]	Bratsk	950,000
Do.	Irkutsk (United Company RUSAL)[3]	Irkutskaya Oblast'	300,000
Do.	Kandalaksha (United Company RUSAL)[3]	Kola Pennisula	75,000
Do.	Khakas (United Company RUSAL)[3]	Khakassiya	300,000
Do.	Krasnoyarsk (United Company RUSAL)[3]	Krasnoyarskiy Kray	875,000
Do.	Nadvoitsy (United Company RUSAL)[3]	Nadvoitsy, Kareliya (Petrozavodsk) Republic	75,000
Do.	Novokuznetsk (United Company RUSAL)[3]	Novokuznetsk	300,000
Do.	Sayansk (United Company RUSAL)[3]	Sayanogorsk	425,000
Do.	Uralsk (United Company RUSAL)[3]	Kamensk-Uralskiy	150,000
Do.	Volgograd (United Company RUSAL)[3]	Volgogradskaya Oblast'	175,000
Do.	Volkhov (United Company RUSAL)[3]	Volkhov, east of St. Petersburg	20,000
Amber	Kaliningrad Amber enterprise (Kaliningrad regional authorities and Alrosa Co. Ltd.)	Kaliningrad Oblast'	250
Antimony:			
Sb content of concentrate	Sarylakh deposit	Ust'-Nera region, Sakha (Yakutiya) Republic	6,000[4]
Do.	Sentachan deposit	Northeastern Sakha (Yakutiya) Republic	NA
Compounds and metals	Ryazsvetmet plant	Ryazanskaya Oblast'	NA
Apatite, concentrate	Khibiny apatite association (OAO Apatit)	Kola Peninsula	15,000,000
Do.	Kovdor iron ore mining association	do.	700,000
Asbestos	Bazenovskoye chrysotile deposit	Sverdlovsk Oblast'	NA
Do.	Molodeznoye deposit	Zabaykal'sk (Chita) Oblast'	NA
Do.	"Ogenburg Minerals" Co., Kiembaevskoye chrysotile deposit	Orenburgskaya Oblast'	500,000
Do.	"Tuvaasbest" Plant, Ak-Dovurakskoye chrysotile deposit	Tyva (Kyzyl) Republic	250,000
Do.	"Uralasbest" Mining and Clarification Plant	Central Ural Mountains	1,100,000
Barite	Salarinskiy mining and beneficiation complex	Kvartsitovaya Sopka deposit	100,000
Bauxite	North-Urals mining company (United Company RUSAL)[3]	Severoural'sk region	NA
Do.	South-Urals mining company (United Company RUSAL)[3]	South Ural Mountains	NA
Do.	Severnaya Onega Mine (United Company RUSAL)[3]	Northwest region	800,000
Do.	Komi Aluminum (United Company RUSAL)[3]	Sredne-Timan	3,000,000
Boron, boric acid	Bor Association	Primorskiy (Maritime) Kray	140,000
Do.	Amur River complex	Far East	8,000
Do.	Alga River chemical complex	do.	12,000
Chromite	Saranov complex	Saranovskiy	200,000
Coal	Donets (east) Basin	Rostovskaya Oblast'	30,000,000
Do.	Kansk Achinsk Basin	East Siberia	50,000,000
Do. thousand metric tons	Kuznetsk Basin (Kuzbass)	West Siberia	160,000
Do.	Moscow Basin	Moscow region	15,000,000
Do.	Neryungri Basin	Sakha (Yakutiya) Republic	15,000,000
Do.	Pechora Basin	Komi (Syktyvkar) Republic	30,000,000
Do.	South Yakutiya Basin	Sakha (Yakutiya) Republic	17,000,000

See footnotes at end of table.

TABLE 2—Continued
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Cobalt		MMC Norilsk Nickel	Noril'sk, Kola Peninsula	4,000
Do.		Rezh and Yuzhuralnikel enterprises	South Ural Mountains	2,100
Do.		Ufaleynikel company	Chelyabinsk Oblast', Ural Mountains	4,000
Do.		Khovu-Aksynskoe (nickel-cobalt) deposit	Khovu-Aksy, Tyva (Kyzyl) Republic	NA
Copper:				
Cu in ore		MMC Norilsk Nickel	Noril'sk region, Kola Peninsula	500,000
Do.		Russian Copper Co. (RCC)	Urals	70,000
Do.		Ural Mining and Metallurgical Co. (UMMC)	do.	230,000
Metal, refined		MMC Norilsk Nickel	Noril'sk region, Kola Peninsula	450,000
Do.		Russian Copper Co. (RCC)	Urals	170,000
Do.		Ural Mining and Metallurgical Co. (UMMC)	do.	360,000
Diamond, gem and industrial	thousand carats	Almazy Rossii-Sakha Joint Stock Company (Alrosa Co. Ltd.) enterprises: Udachnyy mining and beneficiation complex	Sakha (Yukutiya) Republic mines: Zarnitsa and Udachnyy	NA
Do.	do.	Mirny mining and beneficiation complex	Mir and International	NA
Do.	do.	Aikhal mining and beneficiation complex	Aikhal and Komsomol'skiy	NA
Do.	do.	Anabaraskiy mining and beneficiation complex	Alluvial mines	NA
Do.	do.	Nyurbinskiy mining and beneficiation complex	Nyurbinskiy and Botuobinskiy	NA
Do.	do.	Lomonosov	Arkhangel'skaya Oblast'	NA
Feldspar		Kheto-Lanbino and Lupikko deposits	Kareliya (Petrozavodsk) Republic	NA
Ferroalloys		Kosaya Gora iron works	Kosaya, Gora	200,000
Do.		Kuznetsk ferroalloys plant	Novokuznetsk	400,000
Do.		Lipetsk iron and steel works	Lipetskaya Oblast'	NA
Do.		Serov ferroalloy plant	Sverdlovsk Oblast'	NA
Do.		Chelyabinsk electrometallurgical plant	Chelyabinskaya Oblast'	450,000
Do.		Chusovoy iron and steel plant	Perm' Kray	NA
Do.		Klyuchevsk ferroalloy plant	Dvurechensk	160,000
Ferronickel		Ufaleynikel company	Chelyabinsk Oblast', Urals	5,000
Ferrovanadium		Vanadii-Tulachermet	Tula, North Caucasus	NA
Fluorspar		Abagaytuy deposit	Transbaikal	NA
Do.		Usugli Mine	do.	NA
Do.		Kyakhtinsky deposit	do.	NA
Do.		Kalanguy mining complex	Zabaykal'sk (Chita) Kray, Transbaikal	NA
Do.		Yaroslavsky mining-beneficiation complex	Pogranichnoye and Vosnesenskoye deposits, Russian Far East's Primorskiy (Maritime) Kray	NA
Gold	kilograms	Mining companies: Amur a/s ZAO	Mining regions: Khabarovsk Kray	5,500
Do.	do.	Buryatzoloto OAO	Buryat Republic	5,000
Do.	do.	Chukotka a/s	Chukotsk Autonomous Oblast'	1,700
Do.	do.	GRK Aldanzoloto OOO	Sakha (Yukutiya) Republic	4,000
Do.	do.	LT-Resurs, ZAO	Irkutsk Oblast'	2,700
Do.	do.	Neryungri-Metallik, OOO	Sakha (Yukutiya) Republic	1,500
Do.	do.	Nirungan, OOO	do.	1,100
Do.	do.	Omchak OAO	Magadan Oblast'	3,000
Do.	do.	Omolonskaya ZRK, OAO	do.	5,000
Do.	do.	Omsukchanskaya GGK, ZAO	do.	3,000
Do.	do.	Oyna, a/s	Tyva (Kyzyl) Republic	1,500
Do.	do.	Pokrovskiy Mine OAO	Amur Oblast'	6,000
Do.	do.	Polimetal, MNPO, OAO	Magadan and Sverdlovsk Oblast's, Khabarovsk Kray	7,500
Do.	do.	Polyarnaya, a/s	Chukotsk Autonomous Oblast'	1,000
Do.	do.	Polyus ZAO	Krasnoyarsk Kray	38,000
Do.	do.	Priisk Drazhnyy, OOO	do.	1,200
Do.	do.	Priisk Solov'yevskiy, OAO	Amur Oblast'	1,500
Do.	do.	Ros-DV, OOO	Khabarovsk Kray	1,100

See footnotes at end of table.

TABLE 2—Continued
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Gold—Continued		Mining companies—Continued:	Mining regions—Continued:	
Do.	kilograms	Russdragmet OOO	Khabarovsk Kray, Chita Oblast'	6,000
Do.	do.	Seligdar, a/s	Sakha (Yukutiya) Republic	2,000
Do.	do.	Sovrudnik, OOO	Krasnoyarsk Kray	2,000
Do.	do.	Susumanzoloto, OAO	Magadan Oblast'	3,000
Do.	do.	Seligdar, a/s	Sakha (Yukutiya) Republic	2,000
Do.	do.	Sovrudnik, OOO	Krasnoyarsk Kray	2,000
Do.	do.	Susumanzoloto, OAO	Magadan Oblast'	3,000
Do.	do.	Uralelktomed', OAO	Sverdlovsk Oblast'	1,400
Do.	do.	Vitim. a/s	Irkutsk Oblast'	2,900
Do.	do.	Votok, a/s	Khabarovsk Kray	1,100
Do.	do.	Yuzhuralzoloto	Chelyabinsk Oblast'	4,200
Do.	do.	Zapadnaya, a/s	Krasnoyarsk Kray	1,900
Do.	do.	Zolotaya, ZDK, ZAO	Khakasiya Republic	1,200
Iron ore		Kursk Magnetic Anomaly (KMA) region, which contains the following enterprises:	Locations:	50,000,000 [4]
		Lebedi and Stoilo	Gubkin	
		Mikhaylovka	Zheleznogorsk	
Do.		Northwest region, which contains the following enterprises:	Locations:	22,000,000 [4]
		Kostomuksha	Kostomuksha	
		Kovdor	Kola Peninsula	
		Olenegorsk	Olenegorsk	
Do.		Siberia region, which contains the following enterprises:	Locations:	18,000,000 [4]
		East:		
		Korshunovo	Zheleznogorsk	
		Rudnogorsk	Rudnogorsk	
		West:		
		Abakan	Abaza	
		Sheregesh	Sheregesh	
		Tashtagol	Tashtagol	
		Teya	Vershina Tei	
Do.		Ural Mountains region, which contains the following enterprises:	Locations:	22,000,000 [4]
		Akkermanovka	Novotroitsk	
		Bakal	Bakal	
		Goroblagodat	Kushva	
		Kachkanar	Kachkanar	
		Magnitogorsk	Magnitogorsk	
		Peshchanka	Rudnichnyy	
Lead-zinc, recoverable content of ore:				
Lead, recoverable Pb content of ore		Altay mining-beneficiation complex	Altay (Barnaul) Kray, South Siberia	2,000
Do.		Dalpolymetal mining-beneficiation complex	Primorskiy (Maritime) Kray	20,000
Do.		Nerchinsk polymetallic complex	Chitinskaya Oblast'	7,000
Do.		Sadon lead-zinc complex	Severnaya Osetiya-Alaniya Republic	5,000
Do.		Salair mining-beneficiation complex	Kemerovo Oblast'	2,000
Zinc, recoverable Zn content of ore		Altay mining-beneficiation complex	Altay (Barnaul) Kray, South Siberia	1,000
Do.		Dalpolymetal mining-beneficiation complex	Primorskiy (Maritime) Kray	25,000
Do.		Nerchinsk polymetallic complex	Chitinskaya Oblast'	12,500
Do.		Sadon lead-zinc complex	Severnaya Osetiya-Alaniya Republic	14,000
Do.		Salair mining-beneficiation complex	Kemerovo Oblast'	10,500

See footnotes at end of table.

TABLE 2—Continued
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Lead, metal	Dalpolymetal lead smelter	Rudnaya in the Primorskiy (Maritime) Kray	20,000
Do.	Elektrotzink lead smelter [Ural Mining and Metallurgical Co. (UMMC)]	Vladikavkaz in North Caucasus	40,000
Magnesite	Karagayskiy open pit and Magnezitovaya underground mine (Magnezit Group)	Sakha group of deposits (Chelyabinsk Oblast')	3,800,000[4]
Magnesium, metal (for sale)	Avisma plant	Berezniki	35,000
Do.	Solikamsk plant (Uralkaliy)	Perm' Kray	30,000
Mica	Emel'dzhak deposit, Aldan Shield	Sakha (Yakutiya) Republic	NA
Do.	Lopatova Guba mica pit, Northern Kareliya	Kareliya (Petrozavodsk) Republic	NA
Do.	Kovdor phlogopite Mine (Mica Mine; Slyuda Mine; Kovdorslyuda Shaft)	Kola Peninsula, Murmansk Oblast'	NA
Do.	Irkutsk complex (JSC "Vostoksluda")	Mam deposit, Irkutsk Oblast'	NA
Molybdenum	Dzhida tungsten-molybdenum Mine	West Transbaikal	NA
Do.	Sorsk molybdenum mining enterprise	Khakasiya (Abakan) Republic	NA
Do.	Tyrnyauz tungsten-molybdenum Mine	North Caucasus	NA
Do.	Shakhtaminskoye molybdenum mining enterprise	Chitinskaya Oblast'	NA
Natural gas million cubic meters	Komi Republic	Komi (Syktyvkar) Republic	8,000
Do. do.	Noril'sk area	Noril'sk region, Kola Peninsula	5,500
Do. do.	North Caucasus	North Caucasus	6,000
Do. do.	Sakhalin	Far East	2,000
Do. do.	Tomsk Oblast	West Siberia	500
Do. do.	Tyumen Oblast including:	do.	575,000[4]
Do. do.	Medvezhye field	do.	(75,000)
Do. do.	Urengoy field	do.	(300,000)
Do. do.	Vyrngapur field	do.	(17,000)
Do. do.	Yamburg field	do.	(170,000)
Do. do.	Bovanenko field	Yamal Peninsula	NA
Do. do.	Pestsovoyy field	Ob-Taz Gulf area	NA
Do. do.	Zapolyarnyy field	do.	NA
Do. do.	Schtokmanov field	Barents Sea	NA
Do. do.	Urals	Ural'skiye Gory	45,000
Do. do.	Volga	Volgada Oblast'	6,000
Do. do.	Yakut-Sakha	Sakha (Yakutiya) Republic	1,500
Nepheline syenite	Apatite complex	Kola Pennisula	1,500,000
Do.	Kiya-Shaltyr Mine	Goryachegorsk massif, east Siberia	NA
Nickel:			
Ni in ore	MMC Norilsk Nickel	Noril'sk region, Kola Peninsula	300,000
Do.	Yuzhuralnikel company	South Urals	3,000
Do.	Ufaleynikel company	Chelyabinsk Oblast', Urals	17,000
Metal:			
Smelting	MMC Norilsk Nickel	Noril'sk region, Kola Peninsula	160,000
Do.	do.	Pechenga	50,000
Do.	do.	Monchegorsk	50,000
Refining	do.	Noril'sk region, Kola Peninsula	100,000
Do.	do.	Monchegorsk	140,000
Ni products and Ni in FeNi	Rezh, Ufaleynikel, and Yuzhuralnikel enterprises	South Urals	65,000
Niobium (columbium)	Karnarsurt mining enterprise (AO Sevredmet)	Lovozerskoye deposit, Kola Peninsula	12,000
Oil shale	Leningradslanets Association	Slantsy, Leningrad Oblast'	5,000,000
Petroleum	East Siberia, Tomsk Oblast	Tomskaya Oblast'	11,000,000
	European Russia:	Locations:	
Do.	Astrakhan	North Caspian Sea Basin	700,000
Do.	Bashkortostan	Ural'skiye Gory	28,000,000
Do.	Checheno-Ingush Republic	Southern Caucasus	4,500,000
Do.	Dagestan	North Caucasus	700,000

See footnotes at end of table.

TABLE 2—Continued

RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Petroleum—Continued	European Russia—Continued:	Locations—Continued:	
Do.	Kaliningrad Oblast'	Baltic coast	1,800,000
Do.	Komi Republic	Northwest	15,000,000
Do.	Krasnodar Kray	North Caucasus	2,000,000
Do.	Orenburg Oblast'	Ural'skiye Gory	13,000,000
Do.	Perm Oblast'	do.	12,000,000
Do.	Samara	Volgada Oblast'	16,000,000
Do.	Saratov Oblast'	do.	1,500,000
Do.	Stavropol Kray	North Caucasus	2,000,000
Do.	Tatarstan	Volga River region	40,000,000
Do.	Udmurt Republic	Ural'skiye Gory	9,000,000
Do. thousand metric tons	Fields:	Tyumenskaya Oblast', West Siberia	300,000 [4]
Do. do.	Kogolym	do.	(34,000)
Do. do.	Krasnoleninskiy	do.	(12,000)
Do. do.	Langepas	do.	(30,000)
Do. do.	Megion	do.	(18,000)
Do. do.	Nizhnevartovsk	do.	(70,000)
Do. do.	Noyabrsk	do.	(37,000)
Do. do.	Purneftegaz	do.	(12,000)
Do. do.	Surgat	do.	(48,000)
Do. do.	Uray	do.	(8,000)
Do. do.	Varegan	do.	(10,000)
Do.	Sakhalin Island	Sakhalin Oblast'	2,500,000
Phosphate rock	Kingisepp complex (OAO Fosforit)	Leningradskaya Oblast'	3,500,000
Do.	Lopatino and Yegorevsk deposits	Moscow Oblast'	NA
Do.	Polpinskoye deposit	Bryanskaya Oblast'	NA
Do.	Verkhnekamsk deposit	Ural'skiye Gory	NA
Phosphate rock, apatite concentrate	OAO Apatit	Kola Peninsula	12,000,000
Do.	Kovdor iron mining complex	do.	700,000
Platinum-group metals:			
Ore, PGM content	MMC Norilsk Nickel	Noril'sk region, Kola Peninsula	150
Do.	AO Koryakgeoldobycha, Amur Prospectors	Placer deposits (mostly platinum), Urals; Siberia; Russian Far East	10 [4]
Metals	Krasnoyarsk Nonferrous Metals Plant (Krastsvetmet)	Krasnoyarskiy Kray	NA
Do.	Ekaterinburgskiy plant (EZOTsM)	Sverdlovsk (Yekaterinburg) Republic	NA
Do.	Priobsk plant (OJSC Gazprom Neft)	Khanty-Mansi (Khanty-Mansiisk) Autonomous Okrug	NA
Potash, K_2O equivalent	Uralkaliy	Verkhnekamsk deposit	3,000,000
Do.	OAO Silvinit	Solikamsk-Berezniki regions, Ural'skiye Gory	2,000,000
Rare earths	Lovozerskoye deposit	Kola Peninsula	NA
Salt	AO Bassol'	Lake Baskunchak in Astrakhan' Oblast'	2,500,000
Do.	Dus-Dagskoe deposit	Dus-Dag Mountains	25,000
Silver	Dukat Mine	Magadanskaya Oblast'	1,000
Soda ash	Achinsk plant	East Siberia	595
Do.	Berezniki plant	Ural'skiye Gory	1,080
Do.	Pikalevo plant	Leningradskaya Oblast'	200
Do.	Sterlitamak plant	Bashkortostan Republic	2,135
Do.	Volkhov plant	Leningradskaya Oblast'	20
Steel, crude	Companies:	Locations:	
	Amurstal	Komsomol'sk-na-Amure	1,600,000
Do.	Asha Iron and Steel Works	Chelyabinsk Oblast'	450,000
Do.	Beloretsk Iron and Steel Works	Bashkirskoye	380,000
Do.	Chusovskoy Iron and Steel Works	Perm' Kray	570,000

See footnotes at end of table.

TABLE 2—Continued

RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Steel, crude—Continued	Companies:	Location:	
	Elektrostal Joint-Stock Co.	Moscow	314,000
Do.	Gorkovskoy Metallurgichesky Zavod	Nizhniy Novgorod Oblast'	78,000
Do.	Gur'yevsk Steel Works	Kemerovo Oblast'	160,000
Do.	Karaganda	Karagandinskaya Oblast'	6,300,000
Do.	Kuznetsk Steel Works	Kemerovo Oblast'	4,700,000
Do.	Lys'va Metallurgical Plant	Permskaya Oblast'	350,000
Do.	Magnitogorsk Iron and Steel Works (MMK)	Chelyabinsk Oblast'	16,200,000
Do.	Mechel	do.	7,000,000
Do.	Nizhniy Sergi Steel Works	Sverdlovsk (Yekaterinburg) Oblast'	300,000
Do.	Nizhniy Tagil Iron and Steel Works	do.	8,000,000
Do.	Nosta JSC (JSC Orsk-Kahlilovo Iron and Steel Works)	Novotroitsk, Orenburgskaya Oblast'	4,600,000
Do.	Novolipetsk Iron and Steel Corp. (NLMK)	Lipetskaya Oblast'	9,900,000
Do.	Novosibprokat Joint-Stock Co.	Novosibirskaya Oblast'	1,100,000
Do.	Omutninsk Metallurgical Plant	Kirov Oblast'	210,000
Do.	Oskol Electric Steel Works (OEMK)	Staryy Oskol	2,500,000
Do.	Petrovsk-Zabaykal'skiy Steel Works	Petrovsk-Zabaykal'skiy	426,000
Do.	Revdinskiy Steel and Wire Production Works	Sverdlovsk (Yekaterinburg) Oblast'	281,000
Do.	Salda Steel Works	do.	1,900
Do.	Serov Steel Works	do.	1,000,000
Do.	Serp i Molot (Moscow Metallurgical Works)	Moscow	70,000
Do.	Severskiy Tube Works	Polevskoy, Sverdlovsk Oblast'	825,000
Do.	Severstal	Vologada Oblast'	14,000,000
Do.	Sibelektrostal Metallurgical Works	Krasnoyarskiy Kray	110,000
Do.	Sulinskiy Steel works (Staks)	Rostov Oblast'	280,000
Do.	Taganrog Iron and Steel Works (Tagmet)	do.	925,000
Do.	OAO Tulachermet	Tula Oblast'	18,400
Do.	Viz-Stal (Verkh-Isetsk Steel Works)	Sverdlovsk (Yekaterinburg) Oblast'	132,000
Do.	Volgograd Steel Works (Red October)	Volgograd Oblast'	2,000,000
Do.	Vyksa Steel Works	Nizhniy Novgorod Oblast'	540,000
Do.	Zapsib Met Kombinat (West Siberian Steel Works)	Kemerovo Oblast'	6,900,000
Do.	Zlatoust Iron and Steel Works	Zlatoust, Chelyabinsk Oblast'	1,200,000
Talc	Onotsk deposit	Irkutskaya Oblast'	NA
Do.	Kirgiteysk deposit	Krasnoyarskiy Kray	NA
Do.	Miass deposit	Chelyabinsk Oblast'	NA
Do.	Shabrovsk deposit	Sverdlovsk (Yekaterinburg) Oblast'	NA
Tantalum, ore	Deposit or complex:		10[4]
	Lovozerskoye deposit	Kola Peninsula	
	Zabaykalskiy mining and beneficiation complex	Etykinskoye deposit	
Tin:	Novosibirsk mining-beneficiation complexes:	Locations:	
Ore	Khinganskoye olovo (Jewish Autonomous District)	Khabarovskiy Kray	NA
Do.	Dalolovo	Solnechnyy deposit, Primorskiy (Maritime) Kray	NA
Do.	Deputatskiy (Sakhaolovo)	Sakha (Yakutiya) Republic	NA
Do.	Vostokolovo	Russian Far East	NA
Do.	Iultin mining-beneficiation complex	Magadanskaya Oblast'	NA
Do.	Khrustalnyy mining-beneficiation complex	Primorskiy (Maritime) Kray	NA
Do.	Pevek mining-beneficiation complex	Magadanskaya Oblast'	NA
Metal	Novosibirsk smelter	Novosibirskaya Oblast'	NA
Do.	Podol'sk smelter	Podol'sk	NA
Do.	Ryazan smelter	Ryazanskaya Oblast'	NA

See footnotes at end of table.

TABLE 2—Continued

RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Titanium:			
Metal	Moscow plant	Moscow	NA
Do.	Podol'sk plant	Podol'sk	NA
Do.	Verkhnaya Salda Metallurgical Production Association (VSMPO)-Avisma Titanium-Magnesium complex	Sverdlovskaya Oblast', Ural Mountains	NA
Sponge	Verkhnaya Salda Metallurgical Production Association (VSMPO)-Avisma Titanium-Magnesium complex	Sverdlovskaya Oblast', Ural Mountains	40,000
Tungsten:	Deposits:	Locations:	
W content of concentrates	Aginskoye deposit	Sakha (Yukutiya) Republic	NA
Do.	Antonovogorsk deposit	East Transbaikal, Chita Oblast'	NA
Do.	Balkan deposit	Northeast of Magnitogorsk, Ural'skiye Gory	NA
Do.	Belukha deposit	East Transbaikal, Chita Oblast'	NA
Do.	Bom-Grokhom deposit	West Transbaikal	NA
Do.	Dzhida deposit	do.	NA
Do.	Iultin deposit	Magadansk Oblast'	NA
Do.	Kti-Teberdaskoye deposit	North Caucasus	NA
Do.	Lermontovo W-Au deposit	Russian Far East	NA
Do.	Primorsky deposit	do.	NA
Do.	Solnechnyy deposit	Southern Khabarovskiy Kray	NA
Do.	Tyrnyauz tungsten-molybdenum mining and processing complex	Kabardino-Balkariya (Nal'chik) Republic, North Caucasus	NA
Metal, tungsten anhydride	Gidrometallurg plant	do.	NA
Uranium, U content	TVEL Corp. enterprises: ZAO Dalur mining enterprise OAO Khiagda mining enterprise Priargunsky mining and chemical enterprise	Locations: Kurganskaya Oblast' Buryatiya (Ulan-Ude) Republic Krasnokamensk, Zabaykal'sk (Chita) Kray	3,500 [4]
Vanadium:			
Ore	Kachkanar iron mining complex	Ural'skiye Gory	NA
Metal	Chusovoy and Nizhniy Tagil plants	do.	17,000
Pentoxide	Vanadii-Tulachermet	Tula Oblast', North Caucasus	NA
Zinc:			
Zn content of ore	Bashkir copper-zinc complex	Sibai, southern Ural Mountains	5,000
Do.	Buribai copper-zinc mining complex	Buribai, southern Ural Mountains	1,500
Do.	Gai copper-zinc mining-beneficiation complex	Gai, southern Ural Mountains	25,000
Do.	Kirovgrad copper enterprise	Kirovgrad, central Ural Mountains	1,200
Do.	Sredneuralsk copper complex	Revda, central Ural Mountains	5,000
Do.	Uchali copper-zinc mining-beneficiation complex	Uchalinskiy Rayon, southern Urals	90,000
Metal	Chelyabinsk electrolytic zinc plant	Chelyabinskaya Oblast'	200,000
Do.	Elektrotsink plant [Ural Mining and Metallurgical Co. (UMMC)]	Vladikavkaz, North Caucasus	90,000
Do.	Uralelektromed plant [Ural Mining and Metallurgical Co. (UMMC)]	Verkhnaya Pyshma	17,000
Zirconium, baddaleyite concentrate	Kovdor iron ore mining and beneficiation complex	Kola Peninsula	3,500

[e] Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

[1] Table includes data available through February 28, 2009.

[2] Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

[3] United Company RUSAL was formed by the merger of RUSAL (Russian Aluminum), SUAL (Siberian-Urals Aluminum Company), and the alumina assets of Glencore International AG of Switzerland; the merger was completed in March 2007.

[4] Capacity estimates are totals for all enterprises that produce that commodity.

THE MINERAL INDUSTRY OF SERBIA

By Mark Brininstool

Serbia was a modest producer of mineral commodities and continued to recover from the damage to its infrastructure and economy that resulted from the NATO bombing campaign aimed at ending fighting in Kosovo in 1999. The status of Kosovo remained an important political issue that could affect political and economic stability and mineral production in the region. Economic and mineral production data for Serbia in this report do not include data for Kosovo, as reliable data have not been available since 1999 (Statistical Office of the Republic of Serbia, 2008, p. 4).

Minerals in the National Economy

Serbia reported a 7.1% increase in the gross domestic product (GDP) in constant prices compared with the GDP in 2006 (Statistical Office of the Republic of Serbia, 2009). The overall value of mining and quarrying decreased by 0.2% and made up about 1.3% of the GDP. Within the category of mining and quarrying, the value of production of energy-producing materials decreased by 0.6% and the value of production of nonenergy-related mining increased by 2.5%. The value of exports from mining and quarrying increased by about 63% to $57 million and the value of imports increased by about 10% to $2.5 billion compared with 2006 trade figures. The large trade deficit in mining and quarrying was mainly owing to imports of crude petroleum and gas products, which were valued at about $2 billion in 2007 (Statistical Office of the Republic of Serbia, 2008, p. 129-30, 281-82).

Government Policies and Programs

Two main laws regulate mining activities in Serbia. The Mining Law, as amended, regulates mining activity and construction, and the use and maintenance of mining structures. The Law on Geological Explorations regulates geologic explorations (Ministry of Mining and Energy [Serbia], 1995a, b; 2006).

Production

Serbia was a modest producer of copper and lead and zinc ores, as well as gold, platinum-group metals, selenium, and silver. Reported production of such industrial minerals as cement, salt, and sand and gravel increased, although production of the majority of Serbia's industrial minerals was not reported and had to be estimated. Coal production in Serbia increased slightly compared with 2006 production figures mainly owing to a 1% increase in the production of lignite. Natural gas and crude oil output each decreased slightly (table 1).

Structure of the Mineral Industry

Table 2 presents information on Serbia's significant mineral facilities.

Commodity Review

Metals

Aluminum.—Serbia increased production of secondary aluminum by 26.7% to 1,544 metric tons (t). Serbia exported 70,843 t of aluminum and aluminum products and imported 118,023 t, which was an increase of 30.7% and 25%, respectively, compared with 2006 trade data (Statistical Office of the Republic of Serbia, 2008, p. 287, 291).

Copper.—Production of copper ore increased by 19% and that of all refined copper products decreased by 23% compared with 2006 production figures. Progress toward the privatization of Serbia's main copper producer, Rudarsko Topionicki Bazen Bor (RTB Bor), continued in early 2007 when Romanian copper producer Cuprom S.A. won the initial tender for the purchase of RTB Bor. The Romanian firm offered a bid of $400 million with an included obligation to invest about $180 million in the company, but the deal was canceled after Cuprom would not make financial guarantees toward the purchase. Cuprom claimed that the labor union at RTB Bor was opposed to the deal, but the failure to complete the purchase agreement may also have been the result of a reevaluation of the economics of the potential purchase (AFX News Ltd., 2007; Associated Press, The, 2007b). A second tender was held and Austria's A-Tec Industries AG was named the winner in November; final contract negotiations began in December. A-Tec bid $466 million[1] and agreed to make $180 million in investments to take control of RTB Bor's two open pit mines, one underground mine, and one smelting and refining facility. The Russian firm Strikeforce Mining and Resources Ltd. (the mining division of the Basic Element investment group) came in second with a bid of $370 million and stated that it was still interested in purchasing RTB Bor if A-Tec and the Serbian Government do not reach a final agreement (Reuters, 2007; Rudarsko Topionicki Bazen Bor, 2007).

Canadian companies Dundee Precious Metals Inc., Euromax Resources Ltd., and Reservoir Capital Corp. continued exploration for copper and precious metals in Serbia. Dundee Precious Metals had been exploring in Serbia since 2004, and by the end of 2007, it held 11 exploration licenses and 3 concession licenses that covered a total of 901 square kilometers (km^2) (348 square miles), with other license applications for exploration rights to an additional 1,000 km^2 (386 square miles) pending (Dundee Precious Metals Inc., 2008, p. 10, 34). Euromax operated exploration projects at five locations throughout Serbia (Euromax Resources Ltd., 2008, p. 4-5). In February 2007, Reservoir Capital purchased European Minerals Inc.'s six Serbian exploration permits and one exploration application for about $421,000 (Reservoir Capital Corp., 2008, p. 1).

Iron and Steel.—Serbia's steel and pig iron production decreased by 19.5% and 10%, respectively, compared with production in 2006. U.S. Steel Serbia d.o.o. was the only producer of pig iron and crude steel in Serbia and operated two blast furnaces and a three-furnace converter shop and continuous casting complex in Smederevo (U.S. Steel Serbia, d.o.o., 2009). The No. 2 blast furnace at the Smederevo plant was relined in 2007 and was most likely the reason for the decline in iron and steel production, although other factors may have affected output as well. U.S. Steel Serbia's output would be affected by disruptions in supply from Serbia's only natural gas pipeline, which delivered natural gas from Russia through Ukraine and Hungary. In early 2006, gas supplies were disrupted, causing reductions in production, but in 2007, the supply of natural gas was not cited as having affected iron and steel output (United States Steel Corp., 2008, p. 29, 34, 62).

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[1] Where necessary, values have been converted from Canadian dollars (CAN$) to U.S. dollars (US$) at the rate of CAN$1.0748=US$1.00.

Lead and Zinc.—Production of lead ore increased by 15.1% and production of zinc content of concentrate decreased by 50%. A clearer picture of future mine production of lead and zinc awaits the resolution of the final political status of Serbia's lead-and-zinc-rich Kosovo Province and definitive exploration results in the Bor region. Rudarsko-Metalursko-Hemijski Kombinat Olova i Cinka Trepca [Trepca Lead-Zinc Mining, Beneficiation, and Smelting Complex] (Trepca) remained under United Nations (UN) protectorate status.

Industrial Minerals

Serbia produced a broad range of industrial minerals in 2007, which included cement, crude magnesite, lime, quartz sand, and sand and gravel. The production of such major construction materials as cement and sand and gravel increased by about 4% and 1%, respectively, compared with output levels in 2006. Lime production decreased by about 15% compared with production in 2006.

Mineral Fuels

Total coal production increased by 0.8% in 2007, and natural gas and crude petroleum production decreased by 2.8% and 2.3%, respectively. Serbia was dependent on imports to supply its needs for mineral fuels and, in 2007, the country imported 2.6 million metric tons (Mt) of crude petroleum valued at $1.3 billion and 1.5 Mt of natural gas valued at $630 million. Imports of crude petroleum and natural gas increased by 3% in quantity and by 14% in value compared with imports in 2006. Serbia imported about 95% of its crude petroleum and 99% of its natural gas from Russia (Statistical Office of the Republic of Serbia, 2008, p. 290).

In October, the head of Russia's state oil and gas company (Gazprom) met with the Serbian President and Prime Minister in Belgrade to discuss cooperation on energy issues. During the meeting, the participants discussed the possible sale of a controlling share of Serbia's state-owned oil company [Naftna Industrija Srbije (NIS)] to Gazprom. In December, the Russian Government presented Serbia with an initial offer of about $550 million[2] in cash and $685 million worth of investments for a 51% stake in the company. The deal also included an offer to run a portion of Russia's proposed South Stream pipeline through Serbia and to construct a gas storage facility in Serbia. The initial offer was reportedly considered too low and would likely be renegotiated before the Serbian Government makes a decision on the deal (Associated Press, The, 2007a; Southeast European Times, 2007; AFX News Ltd., 2008).

The Mineral Industry of the Serbian Province of Kosovo

The Serbian Province of Kosovo became a UN protectorate in 1999 under the provisions of UN Security Council Resolution 1244 following the Kosovo crisis that year. In 2005, the UN Interim Administration Mission in Kosovo (UNMIK) put into force UNMIK Regulations 2005/2 and 2005/3 to form the legal basis for mining activities in Kosovo. Regulation 2005/2 created the Independent Commission for Mines and Minerals (ICMM), which is responsible for the regulation of mining in Kosovo, including the issuance of exploration and mining licenses and the collection of royalties. Regulation 2005/3 provides Kosovo's mining law and defines the types of licenses that can be issued for exploration and mining projects in Kosovo. The Province of Kosovo's mineral deposits include such metals as bauxite, chromite, lead-zinc ores, and nickel; industrial minerals, including aggregates, dimension stone, and magnesite; and the mineral fuel lignite (Independent Commission for Mines and Minerals, 2009a, b).

Outlook

Serbia's economic recovery and mineral production output are dependent not only on economic factors, but also on political and social developments. The mineral production industries are expected to continue to recover slowly and to stabilize as general economic recovery continues. In 2008, the status of Kosovo and Serbia's dependence on Russian mineral fuels will be major issues that could affect the mineral industry.

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TABLE 1
SERBIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
METALS						
Aluminum ingot, secondary		300 [e]	517 [r]	328	1,219	1,544
Copper:						
Mine and concentrator output:						
Ore:						
Gross weight	thousand metric tons	5,714	5,495	6,005	5,775	6,867
Cu content[e]		28,000	25,000	27,000	28,000	32,000 [e]
Concentrate, Cu content		21,300 [r]	12,200 [r]	12,900 [r]	12,000 [r]	16,500
Metal:						
Blister and anodes:						
Primary		15,100 [r]	13,900 [r]	30,000 [r]	40,000 [r]	30,200
Remelted		3,000 [r]	1,100	1,000 [r]	1,000 [r]	1,000
Total		18,100 [r]	15,000 [r]	31,000 [r]	41,000 [r]	31,200
Refined:						
Primary		11,000 [r]	10,900 [r]	30,100 [r]	40,000 [r]	30,600
Remelted		3,000 [r]	1,100 [r]	1,000 [r]	1,000 [r]	1,000
Total		14,000 [r]	12,000 [r]	31,100 [r]	41,000 [r]	31,600
Gold, refined	kilograms	295 [r]	176 [r]	335 [r]	450 [r, e]	500
Iron and steel, metal:						
Pig iron		635,481	959,019	1,115,195	1,529,177	1,377,478
Crude steel		569,199	1,167,000	1,286,000	1,837,000	1,478,000
Semimanufactures		947,191	1,543,453	1,890,330	2,379,918	2,431,380
Lead:						
Ore:						
Gross weight (Pb-Zn ore)		183,000	180,000	162,000	172,000	198,000
Pb content		2,000	1,000 [r]	1,000 [r]	1,000 [r]	1,000
Metal, primary and secondary, refined[e]		500	800	700	700	700
Magnesium, metal[e]		1,500	1,500	1,500	1,500	1,500
Platinum-group metals:						
Palladium	kilograms	30 [r]	19 [r]	19 [r]	15 [r, e]	15 [e]
Platinum	do.	-- [r]	-- [r]	3 [r]	2 [r, e]	2 [e]
Selenium	do.	7,201	5,170 [r]	8,315 [r]	7,500 [r, e]	7,500 [e]
Silver, mine output, Ag content	do.	2,028	1,036 [r]	2,648 [r]	2,200 [r, e]	4,150

See footnotes at end of table.

TABLE 1—Continued
SERBIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
METALS—Continued						
Zinc:						
Concentrator output, gross weight[e]		6,500	3,800	2,600	6,200	3,000
Zn content of concentrate		2,200 [e]	1,000 [r]	1,000 [r]	2,000 [r]	1,000
Refined		62	4,000	18,000 [r]	15,000 [r]	--
INDUSTRIAL MINERALS						
Asbestos, ore		2,860	7,300 [e]	4,080	4,500	--
Cement	thousand metric tons	2,075	2,240	2,276	2,565	2,677
Clays:[e]						
Ceramic clay		25,000	25,000	25,000	30,000	30,000
Fire clay:						
Crude		30,000	30,000	30,000	40,000	40,000
Calcined		10,000	10,000	10,000	10,000	10,000
Kaolin, crude		99,460 [3]	95,000	95,000	110,000	110,000
Feldspar, crude[e]		3,045 [3]	3,500	3,500	3,500	3,500
Gypsum, crude[e]		42,261 [3]	45,000	45,000	45,000	45,000
Lime	thousand metric tons	402	400 [e]	400 [e]	377 [r]	320
Magnesite:[e]						
Crude	do.	24 [3]	20	20	20	20
Caustic calcined		2,000	1,500	1,500	1,500	1,500
Mica, all grades[e]		185	200	200	200	200
Nitrogren, N content of ammonia		60,000	138,000	111,000	80,000	85,000
Pumice and related volcanic materials, volcanic tuff[e]		100,000	100,000	100,000	100,000	100,000
Salt, all sources		78,271	50,000 [r]	29,847 [r]	29,847 [r]	30,023
Sand and gravel, excluding glass sand	thousand cubic meters	1,507	1,500	7,556	8,633	8,732
Silica:[e]						
Quartz sand		260,880 [3]	260,000	260,000	260,000	260,000
Glass		65,000	80,000	80,000	80,000	80,000
Sodium compounds:[e]						
Caustic soda		7,450 [3]	6,000	7,000	7,000	7,000
Sodium sulfate		800	800	800	800	800
Stone, excluding quartz and quartzite, dimension, crude:[e]						
Ornamental	square meters	69,000	70,000	70,000	70,000	70,000
Crushed and broken, n.e.s.	thousand cubic meters	2,000	2,000	2,000	2,000	2,000
Other, stone blocks	cubic meters	500	500	500	500	500
Sulfur, byproduct:[e]						
Metallurgy	thousand metric tons	40	50	50	50	50
Petroleum	do.	1	1	1	1	1
Total	do.	41	51	51	51	51
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	thousand metric tons	54	50	65	65	66
Brown	do.	397	352	363	316	204
Lignite	do.	34,543	35,192	34,565	36,404	36,803
Total	do.	34,994	35,594	34,993	36,785	37,073
Natural gas, gross production	million cubic meters	364	317	320	282 [r]	274
Petroleum:						
Crude, as reported	thousand metric tons	671	652	648	654	639
Refinery products	do.	2,433 [r]	2,639 [r]	2,582 [r]	2,508 [r]	2,502

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through March 31, 2009.

[2] In addition to commodities listed, common clay and diatomite also are produced, and tellurium may be recovered as a copper refinery byproduct, but available information is inadequate to make reliable estimates of output.

[3] Reported figure.

TABLE 2

SERBIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Antimony, ores and concentrates		Zajaca, Rudarsko Tapionicarski Bazen	Mines and mills near Zajaca, Serbia	80.
Do.		do.	Mines and mill at Rajiceva Gora, Serbia	300.
Antimony, metal		do.	Smelter at Zajaca, Serbia	4.
Cement		Becinska Fabrika Cementa	Plant at Beocin, Serbia	2,031.
Do.		Fabrika Cementa Novi Popovac	Plant at Popovac, Serbia	1,613.
Coal:				
Bituminous		Ibarski Rudnici Kamenog Uglja	Mines at Jarando and Usce, near Baljevac na Ibru, Serbia	250.
Lignite		SOUR Kolubara, Rudarsko Energetsko Industrijski Kombinat, RO	Opencast mines: Polje B and Polje D	10,000.
Do.		Kolubara Povrsinski Kopovi	Tamnavski Kopovi (also known as Kolubarski Rudnici Lignita), near Vreoci, Serbia	14,000.
Do.		SOUR Elektroprivreda Kosova, RO Kosovo, Proizvodnja Separacija i Transport Uglja	Opencast mines: Dobro Selo and Belacevac, near Obilic, Serbia	2,000.
Copper		Rudarsko Topionicki Bazen Bor (RTB Bor)	Smelter at Bor, Serbia	180.
Do.		do.	Electrolytic refinery at Bor, Serbia	180.
Do.		do.	Mine and mill at Bor, Serbia	5,000 ore.
Do.		do.	Mine and mill at Majdanpek, Serbia	15,000 ore.
Do.		do.	Mine and mill at Veliki Krivelj, Serbia	8,000 ore.
Lead, metal		Rudarsko-Metalursko-Hemijski Kombinat Olova i Cinka Trepca (Trepca)	Smelter at Zvecan, Serbia	180.
Do.		do.	Refinery at Zvecan, Serbia	90.
Lead-zinc ore		do.	Mines at Ajvalija, Kopanaonik, Badovac; Trepca, Blagodat, Lece; Veliki Majdan, Tisovak; and Kisnica, Rudnik, Suplja Stijena	5,000.
Do.		do.	Mills at Kriva Feja, Lece, Rudnik, Badovac, Leposavic, Zvecan, and Maravce, Suplja Stijena	3,160.
Do.		Veliki Majdan Rudnik Olova i Cinka	Mine at mill near Krupanj, Serbia	250.
Magnesite, concentrate		Rudnici Magnezita "Sumadija"	Mine and plant at Sumadija, 20 kilometers northwest of Cacak, Serbia	120.
Do.		Rudnik i Industrija Magnezita "Strezovce"	Opencast mine at Beli Kamen, Strezovce, near Itiova Metrovica, Serbia	300.
Do.		do.	Sinter plant at Strezovce	40.
Do.		Magnohrom, Rudnik Magnezita "Magnezit"	Mine at Bela Stena, Baljevac na Ibru, Serbia	30.
Natural gas	million cubic feet	Naftaplin (Naftagas), RO za Istrazivanje, i Prozvodnju Nafte i Gasa	Natural gasfields in Serbia: Kinkinda and others	30,000.
Petroleum:				
Crude	thousand 42-gallon barrels per day	Naftagas, Naftna Industrija Srbije (NIS)	Oilfields in Serbia: Kikinda and others	30.
Refined	do.	Naftagas, Naftna Industrija Srbije (NIS): Rafinerija Nafte Pancevo	Refinery at Pancevo, Serbia	110.
Do.	do.	Rafinerija Nafte Novi Sad	Refinery at Novi Sad, Serbia	28.
Pig iron		U.S. Steel Serbia, d.o.o.	Blast furnace at Smederevo, Serbia	720.
Steel, crude		do.	Plant at Smederevo, Serbia	2,200.
Zinc, metal		Rudarsko-Metalursko-Hemijski Kombinat Olova i Cinka Trepca, Metalurgija Cinka	Electrolytic plant at Titova Metrovica, Serbia	40.
Do.		Hemijska Industrija Zorka	Electrolytic plant at Sabac, Serbia	40.

Do., do. Ditto

THE MINERAL INDUSTRY OF SLOVAKIA

By Mark Brininstool

In 2007, Slovakia continued to produce a modest range of mineral products but was not an important world producer of any minerals. Aluminum and steel were two of Slovakia's most significant metal products, and industrial minerals, such as cement, dolomite, lime, and magnesite, were also produced. Brown coal, including lignite, along with small amounts of natural gas and petroleum were produced, but Slovakia is dependent on foreign imports of gas and petroleum to meet its domestic demand for mineral fuels.

Minerals in the National Economy

In 2007, Slovakia's real gross domestic product (GDP) increased by 10.4%. Industrial production grew by 12.8%, mining and quarrying grew by 25.9%, and manufacturing grew by 15.3% (Statistical Office of the Slovak Republic, 2008a, b).

According to the Ministry of Economy of the Slovak Republic, mineral fuels were the most important mineral trade goods in terms of value in 2007; imports were valued at $6,515 million[1] and exports were valued at $2,802 million. Imports of mineral fuels were down by 9.4% compared with imports in 2006 and made up about 11.2% of the total value of imports in 2007. Iron and steel imports were valued at $2,804 million (which was an increase of 27.4% compared with those of 2006) and exports were valued at $4,071 million (a 2.5% increase); imports of aluminum and articles thereof were valued at $589 million (a 7.5% increase) and exports were valued at $929 million (a 0.4% increase); and imports of ores, slag, and ash were valued at $504 million (a 0.5% increase) and exports were valued at $26 million (a 12.8% increase) (Ministry of Economy of the Slovak Republic, 2009).

Production

Metals

Aluminum.—All primary aluminum production in Slovakia came from Slovalco a.s., which increased production by about 6% compared with production in 2006. Slovalco sold a total of 185,314 metric tons (t) of finished products, of which 76.9% was exported (Slovalco a.s., 2008, p. 13). Alcan Inc. opened Alcan Extruded Products (a $35 million aluminum extrusion plant in Levice), which would likely lead to increased domestic aluminum consumption. The plant was expected to reach planned capacity of 25,000 metric tons per year of extrusion products within 3 to 4 years (Alcan Inc., 2007; Slovak Spectator, The, 2008).

Copper.—In 2007, copper smelter production decreased by 4.5%, but Kovohuty a.s. (Slovakia's only copper smelter) planned to expand production capacity to increase supplies of copper anodes to the Montanwerke Brixlegg copper refinery in Salzburg, Austria. Kovohuty and Montanwerke Brixlegg were owned by A-TEC Industries AG, which was headquartered in Vienna, Austria (A-TEC Industries AG, 2008, p. 10, 12).

Gold.—Multiple gold exploration projects in Slovakia continued in 2007. Tournigan Energy Ltd. continued exploration work in central Slovakia near Kremnica, and EMED Mining explored near Biely Vrch near the Czech and Polish borders. Tournigan also explored for uranium near Kuriskova and Novoveska Huta in eastern Slovakia, and, in 2007, the company doubled its resource estimates at the Kuriskova site to 16,329 t (36 million pounds) of U_30_8 (Tournigan Energy Ltd., 2008, p. 3; EMED Mining, 2009).

Iron and Steel.—In 2007, Slovakia produced 4.8 million metric tons (Mt) of crude steel and a reported 3.627 Mt of iron ore. Before 2007, the Government of Slovakia kept iron ore production figures confidential; as a result, the production figures given for iron ore production and ore content in table 1 for the years 2003 to 2006 are estimates. Because of this, the 418% increase in iron ore production from 2006 to 2007 could be the result of erroneous estimates of iron ore production from 2003 to 2006, faulty data in 2007, or a genuine increase in production; at the time of this writing, the cause of the reported increase in production was unknown.

Outlook

Slovakia will likely continue to produce modest amounts of mineral commodities, but no significant increases in production are expected. Production of alumina, copper, and crude steel are expected to continue to be dependent on imports of ores and concentrate, and the country is likely to continue to import the majority of its mineral fuels.

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TABLE 1
SLOVAKIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
METALS						
Aluminum:						
Alumina		132,089	156,893	162,483	160,507	160,461
Aluminum ingot, primary		165,290	175,000[e]	158,400	179,512	190,237
Copper:						
Metal:						
Smelter, primary and secondary	thousand metric tons	58[r]	13	16	22	21
Refined, primary and secondary		5,800	--	--	--	--
Gallium, metal[e]		5[r]	5[r]	5[r]	5[r]	5
Gold, metal	kilograms	50	50[e]	109	100	100[e]
Iron and steel:						
Iron ore:[e]						
Gross weight	thousand metric tons	930[r]	850[r]	850[r]	700[r]	3,627[3]
Metal content	do.	326[r]	302[r]	259[r]	250[r]	200[e]
Concentrate, gross weight	do.	NA[r]	NA[r]	NA[r]	NA[r]	NA
Metal:						
Pig iron	do.	3,892	3,765[r]	3,681	4,145	4,012
Ferroalloys, total electric furnace[e, 4]	do.	95	95	95	95	95
Ferrochromium		1,924	1,634[r]	894[r]	19[r]	--
Ferromanganese		43,434	66,959	43,458	59,128	60,000[e]
Ferrosilicomanganese		52,773	64,842	47,843	59,128	60,000
Ferrosilicon		41,539[r]	34,684[r]	16,512[r]	16,155[r]	16,000[e]
Steel, crude	thousand metric tons	4,709	4,564	4,242	4,848[r]	4,800
Semimanufactures	do.	4,115	3,995	4,470[r]	4,000[e]	4,000[e]
INDUSTRIAL MINERALS						
Barite, concentrate[e]		12,000	27,100[r, 3]	12,000[r]	15,000[r]	13,000
Cement, hydraulic	thousand metric tons	3,147	3,158	3,499	3,593	3,718
Clays:						
Bentonite		74,938	69,252	75,752	93,373	121,347
Kaolin		31,000	89,420	85,000	30,000	30,000[e]
Ceramic[e]		66,000[3]	50,000	50,000	40,000	40,000
Dolomite	thousand metric tons	1,250	1,117	1,021	990	1,057
Gypsum and anhydrite, crude		93,800	127,100	107,000	110,000	110,000[e]
Lime, hydrated and quicklime	thousand metric tons	847	961	946	1,104	1,123
Magnesite, concentrate		397,259	404,776	447,700	555,710	457,763
Nitrogen, N content of ammonia		288,000	275,223	236,040[r]	241,383[r]	524,536
Perlite		15,000	23,840	13,000[r]	20,000	20,000[e]
Salt		133,100	121,600	150,850[r]	150,000[r]	150,000[e]
Sand and gravel[e]	thousand cubic meters	2,200[r]	2,200[r]	2,000[r]	2,000[r]	2,000
Stone:						
Limestone and other calcareous stones for cement	thousand metric tons	3,453	4,501	6,034	6,611	9,615
Crushed stone	thousand cubic meters	5,075	4,472	6,541	8,727	8,609
Talc		1,000[r]	1,500[r]	1,500[r]	1,500[r, e]	1,500[e]
Zeolites		28,000	37,000	42,000	40,000	40,000[e]

See footnotes at end of table.

TABLE 1--Continued
SLOVAKIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
MINERAL FUELS AND RELATED MATERIALS						
Coal, brown and lignite	thousand metric tons	3,077	2,952	2,511	2,200 [r]	2,111
Coke:[e]						
Metallurgical	do.	1,500	1,500	1,500	1,500	1,500
Unspecified	do.	200	200	200	200	200
Dry natural gas	million cubic meters	198 [r]	170 [r]	142 [r]	198 [r]	142 [p]
Petroleum:						
Crude:						
As reported	thousand metric tons	48	42 [r]	35 [r]	28 [r]	25 [e]
Converted[e]	thousand 42-gallon barrels	325 [r]	285 [r]	237 [r]	190 [r]	170
Refinery products[e]	do.	40,000	44,500	44,500	44,500	40,700 [3]

[e] Estimated; estimated data are rounded to no more than three significant digits. [p] Preliminary. [r] Revised. do. Ditto. NA Not available. -- Zero.

[1] Table includes data available through January 31, 2009.

[2] In addition to the commodities listed, arsenic, diatomite, feldspar, illite, sodium compounds, sulfur, and sulfuric acid are produced, but available information is inadequate to make reliable estimates of output.

[3] Reported figure.

[4] May include some FeCrSi and FeNi, if any was produced.

TABLE 2
SLOVAKIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies[1]	Location of main facilities[2]	Annual capacity
Aluminum	ZSNP Aluminum Works (Slovalco a.s.)	Ziar and Hronom, central Slovakia	195
Antimony:			
Ore	Liptovska Dubrava	Central Slovakia	50
Do.	Pezinok	Western Slovakia	50
Smelter	Vajskova	Central Slovakia	2
Cement	Lietavska Lucka, Stupava, and Turna	Slovakia	5,400
Coal:			
Brown	Hornonitranske Bane, a.s.	Prievidza, central Slovakia	3,500
Do.	Bana Dolina, a.s.	V'lky Krtis, southern Slovakia	500
Lignite	Bana Zhorie, a.s.	Holic, western Slovakia	400
Copper:			
Refinery	Kovohuty a.s.	Krompachy, central Slovakia	30
Ferroalloys	OFZ, a.s.	Istebne	150
Gallium	ZSNP Aluminum Works (Slovalco a.s.)	Ziar and Hronom, central Slovakia	5
Iron:			
Ore	Nizna Slana and Rudnany	Central Slovakia	1,600
Concentrate	do.	do.	1,300
Lead-zinc, ore	Banska Stiavnica	do.	200
Magnesite	SMZ a.s.	Jelsava, eastern Slovakia	370
Do.	Slovmag a.s.	Lubenik, central Slovakia	150
Petroleum, refinery	SLOVNAFT (MOL Plc., 98.5%)	Bratislava	6,000
Do.	Petrochema a.s.	Dubova	NA
Salt	Solivary a.s.	Presov, eastern Slovakia	150
Steel, crude	U.S. Steel Kosice	Kosice, eastern Slovakia	4,700
Do.	Zeleziarne Podbrezova a.s.	Podbrezova	600

Do., do. Ditto. NA Not available.

[1] All mining companies are Government owned.

[2] Names and locations of mines and crude oil refineries are identical.

THE MINERAL INDUSTRY OF SLOVENIA

By Mark Brininstool

As of 2007, Slovenia had attained European Union membership and had a high per capita gross domestic product (GDP) of about $23,000 (Economist Intelligence Unit, 2008, p. 20). Slovenia remained a modest producer of mineral resources and products, with sand and gravel as its only significant resource in terms of world production, and was dependent on imports to supply its mineral needs.

Minerals in the National Economy

In 2007, Slovenia's real GDP increased by 6.8% compared with the GDP in 2006. Industrial production made up about 21% of the GDP in 2007, and mining and quarrying contributed about 0.4% of the GDP. The import value of mine and quarry products amounted to about 2% of the value of total imports. Imports of energy-related products made up about 75% of the total value of imports of mine and quarry products; industrial minerals, about 16%; and metal ores and concentrates, 9%. In terms of value, imports of mine and quarry products exceeded exports by more than 11 times, demonstrating Slovenia's dependence on imports of mineral products (Statistical Office of the Republic of Slovenia, 2008, p. 402, 451-52).

Production

In 2007, Slovenia produced aluminum, secondary refined lead, and steel as well as a modest amount of industrial minerals and mineral fuels. Aluminum production decreased by about 6% compared with production in 2006, and crude steel production increased by about 2%. In the category of industrial minerals, crushed stone production increased by about 24%, and sand and gravel production increased by about 21%, compared with production in 2006. Brown coal production decreased by about 18% and lignite production increased by about 4%, resulting in an increase in total coal production of about 1%. Natural gas and crude petroleum production decreased by about 28% and 2%, respectively (table 1).

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

Outlook

Production of minerals and mineral products will likely continue to be modest, and Slovenia is expected to remain dependent on imports, notably mineral fuels.

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TABLE 1
SLOVENIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007
METALS						
Aluminum, ingot, primary		109,800	120,700 [r]	138,500	118,100 [r]	111,016
Iron and steel, metal:						
Ferroalloys, ferrosilicon[e]		9,000	9,000	9,000	9,000	9,000
Crude steel from electric furnaces		541,000	566,000	583,000	627,000	638,000
Semimanufactures		594,000	621,000	638,939	678,869 [r]	715,539
Lead, refined, secondary		15,000 [r]	15,000 [r]	15,000 [r]	15,000 [r]	15,000
INDUSTRIAL MINERALS						
Cement[e]	thousand metric tons	1,300	1,300	1,500	1,500	1,500
Clays:[e]						
Bentonite		4,000	1,000	140	130	130
Ceramic clay, crude		2,261 [3]	1,819 [3]	1,800	1,800	1,800
Pumice and related materials, volcanic tuff[e]		40,000	40,000	40,000	40,000	40,000
Quartz, quartzite, glass sand[e]		200,000	200,000	200,000	200,000	200,000
Salt, all sources[e]		125,000	1,000	803 [3]	1,624 [3]	2,000
Sand and gravel, excluding glass sand	thousand metric tons	11,012 [r]	12,373 [r]	12,432 [r]	17,873 [r]	21,548
Stone, excluding quartz and quartzite, crude:						
Dimension		12,603	10,667	15,262	15,000 [e]	15,000 [e]
Crushed stone		10,000,000	10,000,000	12,176,491	7,547,058 [r]	9,374,490
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Brown coal	thousand metric tons	608	611	594	587	483
Lignite	do.	4,222	4,198	3,945	3,934	4,079
Natural gas	thousand cubic meters	4,900	5,040	4,335	4,163	3,000
Petroleum, crude		482	344	298	284	278

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto.

[1] Table includes data available through March 31, 2009.

[2] In addition to commodities listed, coke, common clay, lime, and petroleum products also were produced, but available information is inadequate to make reliable estimates of output.

[3] Reported figure.

TABLE 2
SLOVENIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Aluminum	Talum d.o.o. Kidričevo	Smelter at Kidricevo	120
Cement	Salonit Anhovo	Plant at Anhovo	1,120
Do.	Lafarge Cement d.d.	Plant at Trbovlje	600
Coal:			
Brown	SOZC, Rudarsko Energetski Kombinat E. Kardelj	Mines: Sasavski Rudnici at Trbovlje, Hrastnik, Ojstro, Senovo, and Kanizarnica	1,300
Lignite	Rudarsko Energetski Kombinat Velenje, RO Rudnik Lignita-Velenje	Mine at Velenje	5,000
Lead, metal	Rudnik Mežica - Metalurgija, plastika inženiring d.o.o.	Smelter at Zerjav	35
Petroleum, refined	Nafta Lendava	Refinery at Lendava	14
Pig iron	Zdruzeno Podjetje Slovenske Zelezarne	Two blast furnaces at Zelazara Jesenice	300
Do.	Zelezara Store	Electric reduction furnaces at Store pri Celju	290
Steel, crude	Slovenian Steel Group, d.d. (Slovenska industrija jekla)	Plant at Jesenica	400
Do.	do.	Plant at Ravne	162
Do.	Štore Steel d.o.o. (Unior d.d., 54%)	Plant at Store	140

Do., do. Ditto.

THE MINERAL INDUSTRY OF SPAIN

By Alfredo C. Gurmendi

In 2007, Spain was a significant European producer of mineral commodities, such as cement (seventh after China, India, the United States, Japan, Russia, and Republic of Korea), fluorspar (sixth after China, Mexico, Mongolia, South Africa, and Russia), gypsum (second after the United States), and sand and gravel (sixth after the United States, Slovenia, Germany, Austria, and France) (Dolley, 2008; Miller, 2008; Olson, 2008; van Oss, 2008).

Spain has some of the most mineralized territory in Western Europe, including the volcanic-hosted massive sulfide (VMS) deposits of the Iberian Pyrite Belt (IPB) of southern Spain. Within the IPB at least 80 VMS deposits are thought to exist. The leading polymetallic deposits included the Aznalcollar, the Lomero-Poyatos, the Rio Tinto, the Scotiel, and the Tharsis. The IPB alone was estimated to have produced almost 2 billion metric tons of sulfide ore (Cambridge Mineral Resources plc, 2008a, b; Encyclopedia of the Nations, 2008).

Minerals in the National Economy

In 2007, Spain was fully integrated into the European Union (EU) and was qualified for membership in the Economic and Monetary Union (EMU). Membership in the EU was benefiting Spain's economy. During the period 2007-13, the EU's Program for Research and Technological Development, which promotes pro-innovation policies, was providing financial incentives to small- and medium-sized enterprises (SMEs), including SMEs in the energy and mineral fields, to adopt innovative practices and technologies. Through the Risk Sharing Financing Facility (RSFF), which also promotes research and innovation in the EU, a network was set up in 2007 to give SMEs access to the benefits of a single market. Because many countries, such as Spain, would have to make considerable efforts to achieve the Kyoto Protocol targets on greenhouse gas emissions, renewable energy, and energy efficiency that were agreed to at the spring 2007 European Council, the European Commission presented a European Strategic Energy Technology Plan in November. Also, structural reforms undertaken by the EU to enable member countries to share a single market, a single currency, and a single monetary policy have contributed to the achievement of significant progress in such areas as market regulation, wage taxation reform, and policies to boost innovation (Banco de España, 2008; Federation of International Trade Associations, 2008).

Such actions by the EU have allowed Spain to restore confidence in the Government's macroeconomic management and created conditions for lower inflation and interest rates. Inflation was 2.5% in 2007 compared with 3.6% in 2006. In early 2007, the country's economy maintained high growth rates, but it moved towards slower growth by the end of the year. For 2007 as a whole, Spain's real gross domestic product (GDP) growth was 3.8% compared with 3.9% in 2006. The country has a long history of mining and has attracted interest from many major mining companies for gold and base-metal prospecting, exploration, development, and production. The mining and mineral processing industries represented about 1% of the GDP in 2007. Spain had a population of 45.2 million in 2007. The total labor force was 22.2 million, and of this total, services employed 64.6%; industry, 30.1%; and agriculture, 5.3%. The mineral sector employed about 0.5%, or 71,500 of the industry total of 14.3 million (Banco de España, 2008; Federation of International Trade Associations, 2008; U.S. Central Intelligence Agency, 2008; U.S. Department of State, 2008).

Government Policies and Programs

Minerals are owned by the state under an arrangement known as the Regalía Principal. The Mining Law of July 21, 1973, and the Hydrocarbon Law of October 7, 1998, govern the mineral industry. The Dirección General de Política Energética y Minas implements these mineral laws. Law 20 of June 5, 2006, modified the Finance Regime of the Sociedad Estatal de Participaciones Industriales (SEPI), which is a state-owned holding company with mining as one sector in its portfolio. In the mineral sector, SEPI was concerned mainly with the following three state-owned companies: Hulleras del Norte, S.A. (HUNOSA), which produced coal; Minas de Almadén y Arrayanes, S.A. (MAYASA), which produced mercury; and Enusa Industrias Avanzadas, S.A. (ENUSA), which produced nuclear energy. The Instituto Geológico y Minero de España (IGME) is the principal Government agency concerned with mineral resources. IGME offers assistance in the fields of geology and mining to the private and public sectors through the production of maps and scientific publications (Federation of International Trade Associations, 2008; Sociedad Estatal de Participaciones Industriales, 2008).

Production

Production data for selected mineral commodities are in table 1. Primary aluminum metal production in 2007 remained at about the same level as in 2006 [350,000 metric tons (t)], as did production of refined copper (290,000 t). Since 2004, mined lead and zinc have not been reported owing to closures of the base-metals mines, including the Aznalcollar, the Reocin, the Rubiales, the Sotiel, and the Tharsis Mines. Mine production of nickel remained at the same level as that of 2006 (6,400 t); fluorspar production decreased to 149,032 t in 2007 from 153,105 t in 2006, or by 2.7%. Quarried mineral products, particularly quarried stone, accounted for a significant share of the mineral production in Spain. Spain was a leading producer of natural sodium sulfate and of slate and strontium minerals, and an important processor of domestic and imported raw materials. In 2007, Spain's domestic energy production consisted of coal (32.1%), natural gas (30.4%), nuclear (24.6%), hydropower (11.8%), and petroleum (1.1%). Spain's energy consumption sources (production and imports) were petroleum (49.4%), natural gas (22.1%), coal (15.2%), nuclear (10.0%), and hydropower (3.3%) (Ministerio de Industria, Turismo y Comercio, 2007, p. 19, 43).

Structure of the Mineral Industry

The structure of Spain's mineral industry is listed in table 2. Spain's accession to the EU in January 1986 required the country to open its economy to trade and investment, modernize its industrial base, improve its infrastructure, and revise its economic legislation to conform to EU guidelines. Spain followed the U.S.-EU mutual recognition agreements in its application of nontariff regulations and conformity assessment procedures. The mineral industry was made up of a mix of state-owned companies, joint ventures between the Government and the private sector, and privately owned companies. In 2007, Cambridge Mineral Resources plc (CMR) owned 100% of its local subsidiary, Recursos Metallicos SA, which held mining licenses for the Lomero-Poyatos auriferous polymetallic massive sulfide deposits. The licenses are valid for 45 years (Cambridge Mineral Resources plc, 2008a; Encyclopedia of the Nations, 2008).

In terms of the value of mine output of metallic and nonmetallic minerals and quarry products, Spain was one of the leading countries in the EU. Since 2002, Spanish legislation had abolished state and private monopolies, and the Government continued with its program of liberalization in 2007. The liberalization of the electricity and natural gas sectors and the loosening of labor market regulations were accomplished sooner than required by the EU. Some of Spain's regional governments, such as the governments of Andalusia, Asturias, and Cataluña, expressed interest in developing the mineral resources in their geographic areas (Sociedad Estatal de Participaciones Industriales, 2008, p. 10-11, 26; Encyclopedia of the Nations, 2008).

Mineral Trade

The share of foreign trade in Spain's GDP was about 55% in 2007. Spain's leading export partners were France (18.7%), Germany (10.9%), Portugal (8.9%), and Italy (8.5%). Its leading import partners were Germany (14.2%), France (12.8%), Italy (8.3%), and China (5.5%) (Federation of International Trade Associations, 2008).

Commodity Review

Metals

Bauxite and Alumina and Aluminum.—Alumina and primary aluminum were produced almost entirely by Alcoa Inespal S.A. (a subsidiary of Alcoa Inc. of the United States) both for domestic consumption and for export. Alcoa Inespal was a holding company with two primary aluminum plants and three flat-rolled sheet and extrusions plants. The Alcoa smelter in Aviles was to be modernized by 2008 with an investment of $55 million. Alúmina Española S.A., which was located near San Ciprian, was Alcoa's only European producer of alumina and alumina hydrates, and alumina chemicals and primary aluminum (Alcoa Inespal S.A., 2008a, b).

Copper.—Inmet Mining Corp. (IMC) of Canada announced that it had completed the acquisition of a 70% interest in Las Cruces copper project; IMC's wholly owned subsidiary Leucadia National Corp. would retain the remaining 30% interest. Las Cruces is a high-grade VMS copper deposit located on the eastern edge of the IPB and about 15 kilometers (km) northwest of Seville. The project had estimated proven and probable copper reserves of 17.6 million metric tons (Mt) grading 6.2% copper. Its location would provide access to the infrastructure needed to develop a state-of-the-art mining project. High grades and modern extraction technology were expected to enable Las Cruces project to become one of the lowest-cost copper production facilities in the world. The planned production capacity was to be 72,000 metric tons per year (t/yr) of copper cathode as an end product; the mine had a projected life of 15 years (2009-23). All construction and development activities pertaining to Las Cruces mill plant and open pit mining were expected to be completed by the first part of 2008 (Inmet Mining Corp., 2008).

Ormonde Mining plc of Ireland, which was a mineral exploration and development company, sought to establish a suite of mid-size mining operations exclusively in Spain that could produce copper, gold, and silver, although the focus would be primarily on gold. Ormonde's main project was La Zarza copper-gold project, which was situated within a mining concession in the IPB in southwestern Spain. A prefeasibility study of La Zarza was completed in September 2006, and a bankable feasibility study was being carried out to develop an underground mining operation. Ormonde was planning to acquire 70% interest in La Zarza by providing $2.2 million (€1.8 million) during a 3-year period under an option agreement with the property owner, Nueva Tharsis S.A.L. La Zarza deposit, which had been formerly mined for pyrite (iron sulfide only), contained copper, gold, and silver mineralization (Ormonde Mining plc, 2007a, b).

Gold.—CMR's Lomero-Poyatos gold deposit was reported to contain estimated reserves of 3.71 Mt grading 3.26 grams per metric ton (g/t) gold, 27.9 g/t silver, 0.87% copper, 1.57% lead, and 1.16% zinc (Cambridge Mineral Resources plc, 2008a).

Ormonde's gold projects included the Salamanca, the Salamon, the Tracia, and the Trives gold projects and La Zarza copper-gold project. The Salamon project, which was located in northwestern Spain, was the most advanced project and contained an estimated 20,000 kilograms (kg) of inferred resources of gold (Ormonde Mining plc, 2007a, b).

Iron and Steel.—Spain produced 19 Mt of steel in 2007 compared with 18.4 Mt in 2006. Compañia Española de Laminación S.L. (Celsa) produced about 2.5 million metric tons per year (Mt/yr) of steel in 2007. Heat lamination of billets was carried out in three mills, each with its own specifications. One mill produced corrugated round rods and rolls; a second mill produced flat bars, squares, angular and round rods, and light sections; and a third mill produced thick structural sections (Compañia Española de Laminación S.L., 2008). Sidenor Industrial, S.L. (Sidenor), which was a leading producer of special steels in Spain, was planning to start producing stainless steel by modernizing its existing electric arc furnace at its plant in Basauri, northern Spain. Sidenor was Spain's leading special long-products, forgings, and molded-parts group (Sidenor Industrial, S.L., 2008).

Nickel.—Rio Narcea Gold Mines Ltd. owned the Aguablanca Mine, which consisted of an open pit, an onsite processing mill, and a potential underground mine. The initial open pit mine life was estimated to be 10.5 years based on the mine's reserves of 15.7 Mt of ore containing 0.66% nickel, 0.46% copper, 0.47 g/t platinum-group metals (PGM), and 0.13 g/t gold. Assumptions at the start of the feasibility study contemplated an annual production of 8,200 t (18 million pounds) of nickel; 6,350 t (14 million pounds) of copper; and 620 kg (20,000 ounces) of PGM. In early January 2003, Rio Narcea had secured an offtake agreement with Glencore International AG of Switzerland for the sale of 100% of the annual concentrate production at the mine until the year 2010. The concentrate would be trucked from Aguablanca to the Port of Huelva or the Port of Sevilla for shipment. The nickel sulfide flotation plant was designed to treat 1.5 Mt/yr of ore with a potential expansion to treat 1.8 Mt/yr. The Aguablanca deposit in southwestern Spain was defined by more than 45,000 meters (m) of drilling. Formed by three zones of magmatic sulfide mineralization, the deposit occurs in a gabbro-norite intrusive along the north contact of the Santa Olalla granodiorite complex. Pyrrhotite, pentlandite, and chalcopyrite make up the dominant sulfide mineralization (Rio Narcea Gold Mines Ltd., 2007, p. 35).

Silver.—Spain's silver production remained at about the same level as that of 2006 (3,600 kg). Ormonde reported that it had entered into an agreement with Polar Mining Oy (a Finnish subsidiary of Dragon Mining NL), which would allow Ormonde to acquire a 50% interest in the Valiña silver project in Lugo Province in northern Spain. Ormonde planned to focus on the potential for an open pit mine with a high-grade resource. Limited previous drilling returned a best interval of 6 m at grades of 451 g/t silver and 1.7 g/t gold, including 1 m at grades of 2,020 g/t silver and 5.8 g/t gold. Anomalous levels of antimony, gold, lead, and silver occur in soil samples over a strike length of 1.1 km. Ormonde's initial work program would entail metallurgical testing designed to investigate the possibility of producing a concentrate containing antimony, gold, and silver for direct sale to a smelter. According to a report dated April 24, 2006, La Zarza deposit's ore reserves contained copper (84,900 t), gold (486,100 troy ounces), and silver (6.9 million troy ounces) (Ormonde Mining plc, 2007a, b).

Tungsten.—Ormonde was evaluating the Barruecopardo high-grade tungsten deposit in the Salamanca area of western Spain with the objective of assessing the continuity of the high-grade mineralization and to establish if the project would support an underground mining operation that used a gravity concentration process. Ormonde also would assess the volume, grade, and rate of recovery of the tungsten contained in the dumps and tailings. The Barruecopardo Mine, which closed in the early 1980s, was then the largest tungsten mine in Spain and produced a high-quality tungsten concentrate from an open pit operation. It was also one of Europe's leading tungsten operations at the time that it was closed. Recent sampling by Ormonde confirmed the presence of gold with the tungsten, and the company planned to evaluate that resource as well (Ormonde Mining plc, 2007a).

Zinc.—Spain's zinc output remained at about the same level as that of 2006 (502,800 t). Asturiana de Zinc S.A. continued production at its San Juan de Nieva Castillon plant. Asturiana's core business was the refining and production of zinc metal, mainly zinc ingots. According to Asturiana, the San Juan de Nieva Castillon plant, which had a capacity of 500,000 t/yr of zinc metal, was the leading single zinc smelter in the world and was also one of the world's lowest-cost zinc operations. CMR's Masa Valverde's zinc and copper mineralization contains resources of almost 12 Mt of zinc grading 3% zinc; 80 Mt of copper grading 0.5% copper; and 16.2 Mt of gold grading 1 g/t gold (Asturiana de Zinc S.A., 2008; Cambridge Mineral Resources plc, 2008b).

Industrial Minerals

Barite.—Spain's barite output decreased to 40,000 t in 2007 from 45,000 t in 2006. Minerales y Productos Derivados S.A. (Minersa) was a main supplier of drilling-grade material. Minersa continued to operate an open pit and a plant at Vera (Minerales y Productos Derivados S.A., 2008a).

Cement.—Spain's cement output remained at about the same level as that of 2006 (54 Mt). S.A. Tudela Veguín planned to boost its white cement production rate to 550 metric tons per day (t/d) from 400 t/d while achieving a significant emission reduction by modernizing its Tudela plant near Madrid (Polysius AG, 2008).

Fluorspar.—Spain's fluorspar output decreased to 149,032 t in 2007 from 153,105 t in 2006. Minersa was Europe's leading fluorspar producer and had a production capacity of 150,000 t/yr of fluorspar concentrates. This production was sustained by Minersa's three deposits in Asturias in the north of Spain—the Emilio, the Jaimina, and the Moscona underground mines, which produced a combined 420,000 t/yr of crude ore fluorspar (Minerales y Productos Derivados S.A., 2008b).

Potash.—Iberpotash S.A., a business unit of ICL Fertilizers Europe, was a leading producer of potash and an important potash resource in the EU. In 2007, Iberpotash mined more than 1 Mt of red potash for fertilizers from two mines in Catalonia, Spain (Iberpotash S.A., 2008).

Mineral Fuels and Other Sources of Energy

Spain has limited energy resources and was strongly dependent upon imports of energy. The country had no major oilfields, one natural gas field located offshore, and coal mines that consisted mainly of low-quality coal. In 2007, proven petroleum reserves were estimated to be 150 million barrels; natural gas reserves, 72 million cubic meters; and coal reserves, 530 Mt. Spain's refinery capacity was almost 1.4 million barrels per day (BP p.l.c., 2008; Lopez de Santillanes, 2008; U.S. Energy Information Administration, 2008).

Coal.—Spain's coal production decreased to 17.2 Mt in 2007 from 18.4 Mt in 2006. Coal continued to be Spain's most plentiful indigenous energy source. In 2007, proved reserves of anthracite and bituminous coal amounted to 200 Mt, and subbituminous coal and lignite amounted to 330 Mt, or a total of 530 Mt (BP p.l.c., 2008).

Private companies produced most of the coal in the country, although the leading producer of bituminous coal was the HUNOSA Group, which was owned by the Government through the SEPI, and the leading producer of lignite was Empresa Nacional de Electricidad S.A. (Endesa) (International Energy Agency, 2007; Ministerio de Industria, Turismo y Comercio, 2007, p. 17).

Crude Oil and Natural Gas.—Spain's production of crude oil increased slightly to 335,000 barrels (bbl) in 2007 from 334,000 bbl in 2006; production of natural gas decreased considerably to almost 42 million cubic meters in 2007 from almost 118 million cubic meters in 2006. Owing to the lack of significant domestic crude oil output, Spain depended on imports; its leading suppliers were Libya, Russia, and Saudi Arabia.

Almost all of Spain's natural gas production came from Poseidon, which was an offshore field operated by Repsol YPF S.A. The country imported 60% of its natural gas from Algeria.

The country produced about 230 billion kilowatts of electricity and consumed about 220 billion kilowatts. The largest share of electricity generation came from conventional thermal plants (52%), hydroelectricity (25%), nuclear (15%), and other renewables (8%). Electricity consumption had grown considerably and was straining the electricity infrastructure; several major blackouts were attributed to supply shortages or transmission grid malfunction (Ministerio de Industria, Turismo y Comercio, 2007).

Renewable Energy.—In Europe, Germany and Spain continued to attract the majority of investments in wind power. In 2007, these two countries represented 66.1% of the EU's wind power growth. The EU's installed capacity to generate electricity using wind power totaled 56,517 megawatts (MW) in 2007, and the leading European countries with wind power installations were Germany (22,247 MW of capacity), Spain (15,131 MW), Denmark (3,125 MW), Italy (2,726 MW), France (2,454 MW), the United Kingdom (2,406 MW), and Portugal (2,150 MW) (European Wind Energy Association, 2008).

Outlook

Spain is a significant EU producer of mineral commodities, including cement, coal, copper, gold, and zinc. Several base-metal, gold, nickel, and tungsten projects are undergoing feasibility studies and most of them are focused on the IPB. According to the Encyclopedia of the Nations (2008), the IPB is a focus of interest for mining companies and a prime target for exploration activities because of past successes in the discovery of large VMS deposits. Owing to Spain's dependence on imported energy, more attention will most likely be directed toward biofuels, clean coal, and renewable energy investments in the foreseeable future (Compañía Logística de Hidrocarburos, 2008, p. 4-5). The Government is expected to support projects related to biofuels. Spain's mining activity is mostly related to industrial minerals and rocks production, which is expected to continue. Despite Spain's significant economic growth, some risks remain, including the country's continued loss of competitiveness and a decline in EU structural funds and foreign direct investment (Federation of International Trade Associations, 2008).

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TABLE 1
SPAIN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
METALS						
Aluminum:						
Alumina[e, 2]		1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Metal:						
Primary		389,100	397,500	394,200	349,000	350,000
Secondary		245,000	245,000	242,600	242,600	243,000
Total		634,100	642,500	636,800	591,600	593,000
Copper:						
Mine output, Cu content		643	1,448	7,900	6,920 [r]	6,900
Metal:						
Blister:						
Primary		290,300	224,300	284,200	263,700	264,000
Secondary		20,000	14,100	10,000	10,000 [e]	10,000
Total		310,300	238,400	294,200	274,000 [e]	274,000
Refined:						
Primary		293,000	208,241	267,300	255,400	255,000
Secondary		14,000	35,000	35,000	35,000 [e]	35,000
Total		307,000	243,241	302,300	290,000 [e]	290,000
Germanium oxide, Ge content[e]	kilograms	5,000	5,000	5,000	5,000	5,000
Gold, mine output, Au content	do.	5,362	5,248 [3]	5,300	3,124 [r]	3,100
Iron and steel, metal:						
Pig iron	thousand metric tons	3,645	4,036	4,200	4,200 [e]	4,200
Ferroalloys, electric furnace	do.	175	175	180	180 [e]	180
Steel:						
Crude	do.	16,287	17,684	17,800	18,400 [r]	19,000
Hot rolled[e]	do.	14,000	15,000	15,000	15,000	15,000
Lead:						
Mine output, Pb content		1,765	--	--	--	--
Metal, secondary		99,100	105,600	110,000	110,100	110,000
Mercury, mine output, Hg content		500	250	--	--	--
Nickel, Ni content of concentrate		--	(3)	5,380	6,336 [r]	6,400
Silver, mine output, Ag content	kilograms	2,246	3,583	3,600	3,584 [r]	3,600
Tin, mine output, Sn content	do.	247	231	--	--	--
Uranium, mine output:						
U content		170	170	--	--	--
U_3O_8 content		200	200	--	--	--
Zinc:						
Mine output, Zn content		15,100	--	--	--	--
Metal, primary and secondary		519,900	525,100	501,400	502,800	503,000
INDUSTRIAL MINERALS						
Barite, $BaSO_4$		44,660	40,776	37,000 [e]	45,001 [r]	40,000
Cement, hydraulic	thousand metric tons	44,747 [r]	45,593	50,347	54,033 [r]	54,000
Clays:						
Attapulgite		18,975	20,796	20,000 [e]	20,000 [e]	20,000
Bentonite		103,174	156,760	105,000 [e]	154,746 [r]	155,000
Kaolin, washed		450,000	437,990	450,000 [e]	464,049 [r]	465,000
Other[e]	thousand metric tons	15,000	15,000	15,000	15,000	15,000
Diatomite and tripoli		52,700	33,799	34,000 [e]	34,000 [e]	34,000
Feldspar		600,000	552,507	580,000 [e]	674,766 [r]	675,000
Fluorspar, CaF_2 content:						
Acid-grade		129,195	135,505	133,495	135,864 [r]	132,753 [4]
Metallurgical-grade		10,503	10,186	10,500	17,241 [r]	16,279 [4]
Total		139,698	145,691	143,995	153,105 [r]	149,032 [4]
Gypsum and anhydrite, crude	thousand metric tons	11,500	12,534	13,000 [e]	14,500 [r]	15,000

See footnotes at end of table.

TABLE 1—Continued

SPAIN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
INDUSTRIAL MINERALS—Continued						
Lime, hydrated and quicklime	thousand metric tons	1,800[e]	1,800[e]	1,818	2,000	2,000
Magnesite, calcined[e]		150,000	150,000	150,000	150,000	150,000
Mica		11,800	7,825	10,000	4,496[r]	4,500
Nitrogen, N content of ammonia	thousand metric tons	432	404	400	400[e]	400
Pigment, mineral:						
Ocher		174,153	138,050	140,000[e]	140,000[e]	140,000
Red iron oxide		5,404	1,734	1,500[e]	1,500[e]	1,500
Potash, K_2O equivalent		594,355	590,000[e]	575,000[e]	435,191[r]	435,000
Pumice		711,898	553,210	600,000	600,000[e]	600,000
Salt:						
Rock, including byproduct from potash works	thousand metric tons	2,563	2,657	3,200	2,834[r]	2,850[4]
Marine and other	do.	1,400	1,336	1,350[e]	1,469[r]	1,500[4]
Sand and gravel, silica sand[5]	do.	105,000	113,948	135,000[e]	130,000[r]	134,000[4]
Sepiolite, meerschaum		690,395	851,647	800,000[e]	800,000[e]	800,000
Sodium compounds, n.e.s.:[e, 6]						
Soda ash, manufactured	thousand metric tons	500	500	500	500	500
Sulfate, natural:						
Glauberite, Na_2SO_4 content		815,560[4]	944,971[4]	9,500,000	9,500,000	9,500,000
Thenardite, Na_2SO_4 content		200,000	165,030[4]	165,000	165,000	165,000
Manufactured		125,000	125,000	125,000	125,000	125,000
Stone:						
Chalk[e]	thousand metric tons	920	1,063[4]	1,000	1,000	1,000
Dolomite	do.	12,000	14,489	15,000[e]	15,000[e]	15,000
Limestone[e]	do.	248,000	265,694[4]	270,000	270,000	270,000
Marble, ornamental	do.	5,000	2,245	2,620	2,600[e]	2,600
Marl[e]	do.	10,000	10,356[4]	10,000	10,000	10,000
Basalt[e]	do.	3,400	5,094[4]	5,000	5,000	5,000
Granite, ornamental	do.	1,412	2,471	2,500[e]	2,500[e]	2,500
Ophite[e]	do.	2,800	3,874[4]	4,000	4,000	4,000
Phonolite[e]	do.	2,000	1,729[4]	1,800	1,800	1,800
Porphyry[e]	do.	2,100	1,139[4]	1,100	1,100	1,100
Quartz[e]	do.	2,000	1,139[4]	1,100	1,100	1,100
Quartzite[e]	do.	2,900	2,873[4]	2,800	2,800	2,800
Sandstone[e]	do.	2,400	3,608[4]	3,400	3,400	3,400
Slate	do.	837	1,429	1,200[e]	1,200[e]	1,200
Other[e]	do.	900	900	900	900	900
Strontium minerals, Sr_2O_4 content		152,383	192,942	188,000[e]	188,000[e]	188,000
Sulfur, byproduct:[e]						
Metallurgy	thousand metric tons	500	500	500	500	500
Petroleum	do.	150	150	115	100	100
Coal (lignite) gasification	do.	1	1	1	1	1
Total	do.	651	651	616	601	601
Talc and steatite[e]		115,000	107,892[4]	100,000	100,000	100,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, marketable:						
Anthracite	thousand metric tons	9,386	8,923	8,553	8,298[r]	7,869[4]
Bituminous	do.	3,181	3,426	3,214	3,222[r]	3,131[4]
Lignite	do.	7,981	8,147	7,587	6,860[r]	6,180[4]
Total	do.	20,548	20,496	19,354	18,380[r]	17,180[4]
Coke, metallurgical	do.	2,500	2,500	2,500	2,500	2,500
Gas, natural:[e]						
Produced	thousand cubic meters	200,000	200,000	200,000	117,916[4]	41,741[4]
Marketed	do.	550,000	370,019[4]	330,000	330,000	330,000

See footnotes at end of table.

TABLE 1—Continued
SPAIN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
MINERAL FUELS AND RELATED MATERIALS—Continued						
Peat[e]		55,000	57,229 [4]	60,000	60,000	60,000
Petroleum:						
Crude	thousand 42-gallon barrels	2,404	1,913	1,261	334 [r]	335 [4]
Refinery products:						
Liquefied petroleum gas	do.	33,234	33,072	33,698	33,700 [e]	33,700
Naphtha[e]	do.	25,000	25,000	25,000	25,000	25,000
Gasoline, motor	do.	76,431	87,797	87,593	87,600 [e]	87,600
Jet fuel	do.	24,456	21,688	21,224	21,200 [e]	21,200
Kerosene	do.	15,942	16,000	16,000 [e]	16,000 [e]	16,000
Distillate fuel oil	do.	111,676	112,000	112,000 [e]	112,000 [e]	112,000
Residual fuel oil	do.	60,353	55,730	57,294	57,300 [e]	57,300
Other[e]	do.	79,461 [4]	80,000	80,000	80,000	80,000
Refinery fuel and losses	do.	27,631	26,000	26,000 [e]	26,000 [e]	26,000
Total[e]	do.	454,184 [4]	457,000	459,000	459,000	459,000

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to total shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through March 31, 2009. Source: Ministerio de Industria, Turismo y Comercio—Secretaría General de Energía, 2007.

[2] Reflects aluminum hydrate.

[3] The Aguablanca operation of Rio Narcea Gold Mines Ltd. was commissioned in December 2004.

[4] Reported figure.

[5] Includes sand obtained as a byproduct of feldspar and kaolin production.

[6] Not elsewhere specified.

TABLE 2
SPAIN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Alumina	Alúmina Española S.A. (Alcoa Inc.)	Alumina plant at San Ciprian, Lugo	1,000
Aluminum	do.	Electrolytic plant at San Ciprian, Lugo	230
Do.	Alcoa Inespal S.A. (Alcoa Inc.)	Electrolytic plant at Aviles	85
Do.	do.	Electorlytic plant at La Coruña	85
Barite	Minerales y Productos Derivados S.A. (Minersa)	Mine and plant at Vera, Almeria	100
Bentonite	Süd-Cheme España SL	Mine and plant at Yuncos, Toledo	150
Cement	Ashland S.A.	Puerto de Sagunton, Valencia	2,000
Do.	do.	Villaluenga de la Sagra, Toledo	2,000
Do.	do.	3 other plants	2,000
Do.	35 other companies	49 other plants	38,000
Coal:			
Anthracite	Antracitas Gaiztarro S.A.	Mines at Maria and Paulina	2,000
Do.	do.	Mines near Oviedo	2,000
Do.	Antracitas del Bierzo S.A.	Mines near Leon	1,000
Bituminous	Hulleras del Norte S.A. (HUNOSA)	Various mines and plant	3,300
Do.	Hulleras Vasco Leonesa S.A.	Santa Lucia Mine, Leon	2,000
Do.	Minas de Figaredo S.A.	Mines near Oviedo	1,000
Do.	Nacional de Carbon del Sur (Encasur)	Rampa 3 and San Jose Mines, Cordoba	200
Lignite	Empresa Nacional de Electricidad S.A. (Endesa)	As Pontes Mine, and Andorra Mine, La Coroña	15,000
Copper:			
Metal	Atlantic Copper S.A. (Freeport MacMoRan Copper & Gold Inc., 100%)	Refinery at Huelva	270
Do.	do.	Electrolytic refinery at Huelva	105
Do.	Industrias Reunidas de Cobre	Smelter at Asua-Bilbao	30
Do.	Elmet SL	Smelter and electrolytic refinery at Berango, Vizcaya	60
Ore, metal	Atlantic Copper S.A. (Freeport MacMoRan Copper & Gold Inc., 100%)	Mines and plant at Arientero near Santiago de Compostela	12
Do.	do.	Alfredo underground mine in Rio Tinto area	30
Do.	Minas de Rio Tinto S.A.	Cero Colorado open pit mine	20
Dunite	Pasek España S.A.	Mines and plant at Landoy, Ortigueira	1,500
Fluorspar, ore	Minerales y Productos Derivados S.A. (Minersa)	Plant at Torre, Asturias	150
Do.	do.	Underground mines at Emilio, Jaimina, and Moscona, Asturias	420
Gold kilograms	Rio Narcea Gold Mines, Ltd.	El Valle and Carles Mines, Asturias	3,750
Lead:			
Metal	Española del Zinc S.A.	Refinery at Cartagena, Murcia	50
Do.	Compañia La Cruz, Minas y Fundaciones de Plomo S.A.	Smelter at Lineares, Jaen	40
Do.	do.	Refinery at Lineares, Jaen	40
Do.	Tudor S.A.	Secondary smelter at Saragoza	16
Do	Ferroaleaciones Españolas, S.A.	Secondary smelter at Medina del Campo	12
Do	Derivados de Minerales y Metales	Secondary smelter at Barcelona	5
Ore	Sociedad Minera y Metalúrgica de Peñarroya de España S.A. (Peñarroya, France, 90%)	Opencast mine at Montos de Los Azules	25
Do.	Exploración Minera International España S.A. (EXMINESA)	Underground mine at Rubiales, Lugo	16
Magnesite	Magnesitas Navarras S.A.	Mine at Eugui, plant at Zubiri	600
Do.	Magnesitas de Rubián S.A.	Plant at Monte Castel	70
Nickel, metal	Rio Narcea Gold Mines Ltd.	Aguablanca Mine, Extremadura	8

See footnote at end of table.

TABLE 2—Continued
SPAIN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Petroleum:				
Crude	42-gallon barrels per day	Chevron S.A.	Oilfield at Casablanca	300
Refined	do.	Repsol YPF S.A.	Refinery at Escombreras	200,000
Do.	do.	do.	Refinery at Puertollano	14,000
Do.	do.	do.	Refinery at Tarragona	260,000
Do.	do.	Refineria de Petróleos del Norte S.A. (Petronor)	Refinery at Somorrostro	240,000
Do.	do.	Compañía Española de Petróleos S.A. (Cepsa)	Refinery at Santa Cruz de Tenerife	160,000
Do.	do.	Petroleos del Mediterraneo S.A. (Petromed)	Refinery at Castellon de la Plana	120,000
Do.	do.	Compañía Iberica Refinadora de Petróleos S.A. (Petroliber)	Refinery at La Coruña	140,000
Potash, ore		Iberpotash S.A. (Dead Sea Works Ltd.)	Mines and plants at Suria near Barcelona	850
Pyrite		Compañia Española de Mines de Tharsis	Mines and plants at Tharsis and Zarza (closed)	1,300
Do.		do.	Plant at Huelva	600
Do.		Rio Tinto Minera S.A. (Rio Tinto plc, 75%, and Rio Tinto Zinc, 25%)	Mines and plant at Rio Tinto (closed 2001)	900
Sepiolite		The Tolsa Group	Mine and plant at Vicalvaro near Madrid	100
Do.		Silicatos-Anglo-Ingleses S.A.	Mine and plant at Villecas near Madrid	200
Silver	metric tons	Polar Minin Oy (Dragon Mining NL, 50%, and Ormonde Mining plc, 50%)	Valiña silver project, Lugo Province	4
Sodium sulfate		Crimidesa S.A.	Mine and plant at Cerezo de Rio, Burgos	600
Steel		Aceralia Corporación Siderúrgica (Arbed S.A., 35%)	Plants at Aviles, Gijon, Sagunto, and Sestao	8,000
Do.		Compañia Española de Laminacion S.L. (Celsa), 100%	Plant at Barcelona	2,600
Do.		Sidenor Industrial, S.L. (Gerdau Group, 50%, and Santander Group, 50%)	Plant at Basauri	2,500
Strontium		Solvay Minerales S.A.	Mines and plant at Escuzar, Granada	85
Do.		Bruno S.A.	Mine and plant at Montevives, Granada	50
Uranium, U_3O_8	metric tons	Empresa Nacional del Uranio (Enusa) (Government, 100%)	Mines and plant near Ciudad Real	500
Zinc:				
Metal		Asturiana de Zinc S.A. (Xstrata plc, 100%)	Electrolytic zinc plant at San Juan de Nieva Castillon	500
Do.		Española del Zinc S.A.	Electrolytic plant at Cartagena	50
Ore		Asturiana de Zinc S.A. (Xstrata plc, 100%)	Reocin mines and plants (closed 2003)	500
Do.		Exploración Minera International España S.A. (EXMINESA)	Underground mine at Rubiales, Lugo	500
Do.		Sociedad Minera y Metalúrgica de Penarroya-Espana S.A.	Mines and plants at Montos de los Azules y Sierra de Lujar, San Agustin	200

Do., do. Ditto.

THE MINERAL INDUSTRY OF SWEDEN

By Harold R. Newman

In 2007, Sweden continued to be an active mining country; the principal mining centers were the Bergslagen, the Norrbotten, and the Skellefte districts. Three of Sweden's largest mines are located in the Norrbotten district. Metal mining and metal products manufacturing dominated the mineral industry. Owing to inadequate indigenous fossil fuel energy resources, Sweden relied on hydrocarbon imports. The country has also developed hydroelectric and nuclear power energy sources.

Foreign companies were actively exploring for base metals, diamond, and gold. Mineral exploration spending rose by 70% in 2007, to $92 million. Drilling companies in Sweden were fully contracted, and drilling equipment was in limited supply; as a result, companies that were conducting mineral exploration were finding it difficult to get additional drilling done (Mining Journal, 2008).

Minerals in the National Economy

Mining and metals production continued to be of economic importance to the country. Sweden was one of the leading ore and metal producing countries in the European Union (EU). The output of the mineral and manufacturing industries enabled Sweden to become a leading exporting country in the EU. The mineral industry contributed 0.3% to Sweden's gross domestic product (Mbendi Information Services (Pty) Ltd., 2007).

Production

Sweden has a variety of mineral resources and was the leading producer of iron ore in the EU. The country exploited ferrous and nonferrous metals, including copper, gold, iron ore, lead, silver, and zinc; and industrial minerals, including crushed stone, dimension stone, and feldspar. Sweden was a major trading country, and the amount of mineral commodities produced depended mainly on the demand for these commodities. Mine production of copper decreased in 2007 whereas primary copper production increased. Production of gold and ferrochrome decreased, whereas production of lead and silver increased (table 1).

Structure of the Mineral Industry

The Swedish mineral industry was composed mostly of privately owned companies and operated on a free-market basis. The Government was the major equity owner of the country's iron ore operations (98%) and had significant ownership in the steel operations (48%). Table 2 is a list of the major mineral industry facilities, their production capacities, and the mineral products they produced.

Mineral Trade

The total value of exported goods in 2007 was $17.5 billion, of which mineral products, including fuels, accounted for 17%. The total value of imported goods was $15.2 billion (Economist, The, 2007).

In 2007, U.S. export trade with Sweden was valued at $4.5 billion and U.S. import trade was valued at $13 billion. Significant export commodities to Sweden from the United States included nonferrous metals (which includes precious metals), $174.4 million; metallurgical grade coal, $50.4 million; and nuclear fuel materials, $33.3 million. Significant import commodities from the United States included iron and steel mill products, $704.5 million; and steelmaking and ferroalloying materials, $73 million. Mineral fuel imports from the United States included fuel oil, $201.6 million; and liquefied petroleum gas, $22 million (U.S. Census Bureau, 2007a, b).

Commodity Review

Metals

Copper.—Lundin Mining Corp. of Canada announced an expansion program at the Zinkgruvan facility in 2007, which would include a significant increase in ore production to 1.2 million metric tons per year (Mt/yr) from 900,000 Mt/yr of ore in 2010. At full capacity, copper production would be 7,200 metric tons per year (t/yr) of copper concentrate for about 12 years of mine life. Definition drilling was underway to upgrade reserves. The estimated cost of the program was expected to be $37 million (Lundin Mining Corp., 2007).

Boliden Mineral AB announced that between 2007 and 2010, the Aitik Mine's production was projected to increase to 33 Mt/yr, and that between 2011 and 2014, production was expected to increase to 36 Mt/yr. The expansion was expected to raise even further the efficiency of a mine that was already one of the world's top performers. The global average performance in ore mining was 15 metric tons per worker-hour. In 2007, the Aitik Mine produced an average of 43 metric tons per worker-hour. After the expansion, Boliden expected to average 55 metric tons per worker-hour with mine cash costs falling from $1,764 per metric ton to $948 per metric ton. The mine life was expected to be extended from 2016 to 2025, and the new production of molybdenum would be added to Aitik's flow sheet (Chadwick, 2008).

Gold.—Lappland Goldminers AB announced the upgrade of its ore resources at Fäboliden. The new estimated mineral reserves and mineral resources totaled 54.2 million metric tons (Mt), excluding inferred mineral resources, with an average grade of 1.23 grams per metric ton (g/t) gold and 4.5 g/t silver, which was equivalent to 66.9 t of gold and 246.5 t of silver. The deposit continued down to a depth of about 600 meters (m). The feasibility study for the open pit mine and potential underground mine was expected to be completed by yearend 2007. The upgraded mineral reserves and resources indicated that the underground operation could contain more gold than the open pit (Lappland Goldminers AB, 2007).

In 2007, Dragon Mining Sweden AB continued exploration that was outlining and upgrading the Svartliden project. The Svartliden project is located in the world class Skelleftea mining district and was a greenfield discovery with a style of mineralization previously not found in the broader region. Dragon Mining held contiguous exploration permits that covered 257 square kilometers (km^2) in the area, and encompassed prospective Palaeoproterozoic meta-sediment-volcanic rock units. Exploration drilling focused on testing depth and strike extensions of known mineralization. Results from 10 drill holes returned the following results, including intercept highlights: 6 m at 41.8 g/t gold from 90 m; 6 m at 6.1 g/t gold from 118 m; and 6 m at 5.6 g/t gold from 132 m. Drilling continued through 2007 to extend known mineralization, define the depth of the deposit, and convert further resources to additional reserves. In the first quarter of 2007, resources were estimated to be 12,000 kilograms of gold (Dragon Mining Sweden AB, 2007, p. 11).

Beowulf Mining plc's Grundtrask project is located near the town of Mala in the Skellefta mining district and comprised three licenses that covered an area of 43 km^2. A gold-bearing structure that runs for a strike length of 750 m and a width of up to 27 m had been associated through diamond drilling and was open at both ends and at depth. The gold is associated with arsenopyrite and chalcopyrite in quartz veins and stock works in altered pre-Cambrian basic volcanic rocks. Beowulf was seeking a joint venture partner for further exploration for both the Grundtrask project and the Ballek project. The Ballek project was associated with a large gravity anomaly (Beowulf Mining plc, 2007).

Iron and Steel.—Luossavaara-Kiirunavaara AB (LKAB) announced that it would conduct extended exploration for iron ore at Kuosanen, Mertainen, and Ylipääsnjaska in the municipalities of Gällivare and Kiruna in the vicinity of Malmberget. Aerial transient electromagnetic (TEM) geophysical surveys would be performed. Electrically conductive horizons down to a depth of 300 to 400 m can be discovered using TEM surveys. Drilling would be performed at locations where mineral deposits were indicated (Luossavaara-Kiirunavaara AB, 2007b).

LKAB announced that it would construct a new main level at the Malmberget Mine. The mine consisted of about 20 large and small, widely distributed ore bodies, of which about 10 were mined in 2007. The ore bodies were at different depths and the lowering of the main level would take place successively in different parts of the mine. Mining was taking place on three main levels; at 600 m, at 815 m, and at 1,000 m below the original surface level. Minable ore reserves were estimated to be 140 Mt of crude ore. Commissioning of the main level was expected to take place during the third quarter of 2010 (Luossavaara-Kiirunavaara AB, 2007a).

Silver.—Tumi Resources Ltd. announced that it had staked the historic Sala Mine, which had contained some of the richest silver ores in the world and for which historical records indicated that more than 5,670 million kilograms had been produced during the life of the mine. Exploration during the past year defined a drill target to the west of the existing mine that trended south for about 1 kilometer. Tumi Resources applied for drilling permits with the appropriate Swedish authorities as required by the Swedish Mining Law. A ground induced polarization survey would be performed before the drilling (Tumi Resources Ltd., 2007).

Industrial Minerals

About 90% of Sweden's industrial mineral output was from carbonates, including chalk and limestone. About 50% of this material was used in the production of cement; the remainder was used in the paper markets and the metallic industries. Nordkalk Group, which had operations at five locations, was a major producer. Other significant producers included the SMA Group and Imerys Minerals AB (Industrial Minerals, 2007).

Fluorspar.—Tertiary Minerals plc of the United Kingdom was awarded exploration licenses in the Vasterbotten district of northern Sweden to cover a major deposit of fluorspar. The Storuman deposit was defined by drilling in a 2.5-km^2 area, and Tertiary considered the deposit to have world class potential. Storuman is a flat-lying sandstone-hosted replacement deposit that had been defined by 39 drill holes. No resource estimate had been made for the deposit, which is typically 3-m to 10-m thick over the license area. Tertiary was planning to initiate a drilling program at Storuman to confirm grades, establish resources, and provide samples for metallurgical test work. Tertiary's conceptual target was a mining operation that would produce about 100,000 t/yr of acid-grade fluorspar (Mineweb, 2007).

Mineral Fuels and Related Materials

Petroleum.—Tethys Petroleum AB was granted a license valid for 3 years to explore for petroleum on the Island of Gotland. The license covered an area of about 54,000 hectares of the northern part of the Baltic Sea. Petroleum had previously been produced on Gotland from Ordovician reef structures that could be traced along a trend line originating on the other side of the Baltic Sea and terminating on Gotland Island. Historical data suggests that only a limited number of the reefs present in the Gotland area had been mapped and drilled (Tethys Petroleum AB, 2007).

Uranium.—The Government reported that Sweden must build four new nuclear reactors and replace its existing 10 units when they reach the end of their lifetimes. Otherwise, according to the Government, the country would not be able to reduce greenhouse emissions. A decision was called for by the Riksdag (Parliament) to allow construction of new units after elections in 2010. That action would require revocation of the current ban on nuclear reactor construction (Platts, 2007).

Mawson Resources Ltd. announced the results of its first 19 drill holes at the Tasjo deposit. The results showed multiple near-surface uranium and rare-earth mineralized horizons, which average 5 m true thickness over an area of 100-m by 500-m. The consistency of grade, the strike extent, and the shallow depth of the uranium mineralization was considered encouraging by Mawson. Further exploration was planned to extend the drilling across a 200-m by 700-m area. Tasjo is a sedimentary uranium deposit where uranium mineralization is associated with concretions of carbonate-fluorapitite, which constitute up to 20% of the rock. Historical drill holes and geologic investigations estimated that 75 Mt to 150 Mt exist at Tasjo, with a grade range of 0.03% to 0.07% uranium oxide, 0.11% to 0.24% rare-earth elements, and 3.8% to 7.5% phosphate (Mawson Resources Ltd., 2007).

Outlook

Mining is expected to remain very significant to Sweden's economy. The global role of Sweden as an iron ore producer may increase dramatically. Within 5 to 10 years, iron ore production is expected to reach 50 Mt/yr, or about double that of today. Sweden has substantial base-metals, gold, and iron ore deposits, which will continue to be actively exploited and developed. Foreign companies are likely to continue to explore actively in Sweden for base metals, diamond, and gold. The quantity of ores in existing mines that can be mined economically will likely be increased by effective and successful ongoing exploration in the vicinity of the mines.

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TABLE 1
SWEDEN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
METALS						
Aluminum, metal:						
Primary		101,200	101,400	102,567 [r]	101,180	98,014 [2]
Secondary[e]		30,000	29,000	30,000	32,000	32,000
Total		131,200	130,400	132,567 [r]	133,180	130,014 [2]
Copper:						
Mine output, Cu content		83,143 [r]	82,415 [r]	87,068 [r]	86,746 [r]	62,905 [2]
Metal:[e]						
Smelter:						
Primary		185,000	206,000	192,000	194,200 [2]	203,107 [2]
Secondary		30,000	30,000	55,000	64,000	55,000
Total		215,000	236,000	247,000	258,200 [2]	258,107 [2]
Refined:						
Primary		189,000	235,620 [r, 2]	223,482 [r, 2]	229,241 [2]	213,894 [2]
Secondary		25,000	25,000	22,000	25,000	25,000
Total		214,000	260,620 [r, 2]	245,482 [r, 2]	254,241 [2]	238,894 [2]
Gold:						
Mine output, Au content	kilograms	5,900	5,200	6,564 [r]	6,848	5,159 [2]
Metal, primary[e, 3]	do.	8,000	8,000	8,000	8,000	8,000
Iron and steel, metal:						
Iron ore concentrate and pellets:[e]						
Gross weight	thousand metric tons	21,500	22,300	23,300	23,300	24,700
Fe content	do.	14,100	14,700	15,300	15,300	16,100
Metal:						
Pig iron and sponge iron	do.	3,710	3,871	3,730 [r]	3,577 [r]	3,815 [2]
Ferroalloys:						
Ferrochromium		110,529	128,191	127,451	136,374	124,403 [2]
Ferrosilicon[e]		17,100 [r]	18,500 [r]	9,800 [r]	4,000	4,000
Total[e]		128,000 [r]	147,000 [r]	137,000 [r]	140,374 [2]	128,403 [2]
Steel, crude	thousand metric tons	5,707	5,949	5,692	5,435	5,700
Semimanufactures[e]	do.	4,600	4,700	4,700	4,500	4,600
Lead:						
Mine output, Pb content		50,962	54,347	60,445 [r]	55,644 [r]	63,224 [2]
Metal, refined:[e]						
Primary		24,200	21,500 [r]	32,800 [r]	25,400	37,900
Secondary		52,000	52,000	46,100 [r, 2]	39,800 [2]	40,000
Total		76,200	73,500 [r]	78,900 [r, 2]	65,200 [2]	77,900 [2]
Molybdenum, oxide, roasted, Mo content[e]		3,000	3,000	3,000	3,000	3,000
Nickel, metal, secondary[e]		50	50	50	50	50
Selenium, elemental, refined[e]		20	20	20	20	20
Silver:						
Mine output, Ag content	kilograms	340,701 [r]	319,563 [r]	309,933 [r]	292,255	323,171 [2]
Metal, primary[e, 3]	do.	250,000	250,000	250,000	225,000	225,000
Zinc, mine output, Zn content		185,884	197,034	215,691 [r]	210,029	214,576 [2]
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand metric tons	2,476 [r]	2,588 [r]	2,600 [e]	2,600	2,500
Diamond, synthetic[e]	thousand carats	20,000	20,000	20,000	20,000	20,000
Feldspar, salable, crude and ground[e]		41,000	42,000	43,000	43,000	42,000
Fertilizer, manufactured:[e]						
Nitrogenous	thousand metric tons	400	400	400	400	400
Phosphatic	do.	10	10	10	10	10
Mixed	do.	300	300	300	300	300
Graphite[e]		850	800	800	800	800
Lime[e]	thousand metric tons	590	590	600	600	600
Quartz and quartzite[e]	do.	600	700	700	700	700

See footnotes at end of table.

TABLE 1—Continued
SWEDEN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
INDUSTRIAL MINERALS—Continued						
Stone:[e]						
Dimension:						
Mostly unfinished	thousand metric tons	170	160	170	170	170
Granite	do.	130	130	132	132	132
Limestone	do.	32	32	32	32	32
Slate	do.	15	15	16	16	16
Other	do.	6	6	6	6	6
Crushed:						
Dolomite	do.	440	430	450	450	450
Granite	do.	3,500	3,500	3,500	3,500	3,500
Limestone:						
Chalk	do.	80	80	80	80	80
For cement manufacture	do.	3,950	3,900	4,000	4,000	4,000
For lime manufacture	do.	950	950	950	950	950
For other construction and industrial uses	do.	1,700	1,700	1,800	1,800	1,800
For agricultural uses	do.	650	600	650	650	650
For other uses	do.	1,500	1,500	1,500	1,500	1,500
Total	do.	8,830	8,730	8,980	8,980	8,980
Sandstone	do.	15	20	20	20	20
Undifferentiated	do.	30,000	30,000	30,000	30,000	30,000
Other	do.	400	350	350	350	350
Sulfur:						
Metallurgy	do.	235	235	240	240	240
Petroleum	do.	57	59	60	60	60
Total	do.	292	294	300	300	300
Talc, soapstone[e]		15,000	14,000	14,000	14,000	14,000
MINERAL FUELS AND RELATED MATERIALS						
Coke, metallurgical[e]	thousand metric tons	1,250	1,300	1,400	1,400	1,400
Gas, manufactured:[e]						
Coke oven gas	million cubic meters	500	500	500	500	500
Blast furnace gas	do.	3,500	3,500	3,500	3,500	3,500
Peat:						
Agricultural use[e]	thousand cubic meters	1,800	1,100	1,200	1,716 [2]	1,700
Fuel	do.	2,633	1,866	1,900	3,041	3,000
Petroleum, refinery products:[e]						
Liquefied petroleum gas	thousand 42-gallon barrels	3,000	4,906 [r, 2]	5,022 [2]	5,000	5,000
Naphtha	do.	500	500 [r]	500	500	500
Gasoline, motor	do.	41,000	38,301 [r, 2]	34,164 [2]	35,000	35,000
Jet fuel	do.	1,600	1,664 [r, 2]	606 [2]	600	600
Kerosene	do.	50	10 [r]	10 [r]	--	--
Distillate fuel oil	do.	58,000	53,995 [r, 2]	53,509 [2]	54,000	54,000
Residual fuel oil	do.	40,000	36,297 [r, 2]	35,785 [2]	36,000	36,000
Other	do.	8,000	20,000 [r]	20,761 [2]	21,000	21,000
Refinery fuel and losses	do.	5,000	10,000 [r]	10,147 [2]	10,000	10,000
Total	do.	157,000	166,000 [r]	161,000	162,000	162,000

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through January 31, 2009.

[2] Reported figure.

[3] Includes only that recovered from indigenous ores, excluding scrap.

TABLE 2
SWEDEN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum		Granges AB (Glencore International AG, 100%)	Sundsvall smelter at Kubikenborg	100
Cement		Cementa AB (Scancem, 100%)	Plants at Degerhamn, Skovde, and Slite	3,400
Copper:				
Ore, copper content		Boliden Mineral AB	Mines at Aitik, Garpenberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	68
Do.		Outokumpu Oyj	Mines at Pahtohavare	22
Metal		Boliden Metals AB	Smelter and refinery at Ronnskar	240
Feldspar		Berglings Malm & Mineral AB (Omya GmbH)	Mines at Beckegruvan, Hojderna, and Limbergsbo	50
Do.		Forshammar Mineral AB (Omya GmbH)	Mines at Limberget and Riddarhyttan	30
Do.		Larsbo Kalk AB (Omya GmbH)	Mines at Glanshamar and Larsbo	20
Ferroalloys		Vargon Alloys AB	Plant at Vargon	175
Gold:				
Ore, gold content	kilograms	International Gold Exploration AB (50%) and Dormant Properties AB (50%)	Bjorkdal Mine at Skellefte	3,000
Do.	do.	Boliden Mineral AB	Mines at Aitik, Akerberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	2,000
Metal	do.	do.	Smelter and refinery at Ronnskar	17,000
Graphite		Woxna Graphite AB (Tricorona Mineral AB, 100%)	Mine and plant at Kringeltjarn, Woxna	20
Iron and steel		Svenskt Stal AB (Government, 48%)	Steelworks at Borlange, Lulea, and Oxelosund	3,900
Iron ore		Luossavaara-Kiirunavaara AB (LKAB) (Government, 98%)	Mines at Kiruna and Malmberget	32,500
Kyanite		Svenska Kyanite AB (Svenska Mineral AB, 100%)	Quarry at Halskoberg	10
Lead:				
Ore, lead content		Boliden Mineral AB	Mines at Garpenberg, Laisvall, Langdal, Petiknas, and Renstrom	110
Do.		North Mining Svenska AB	Zinkgruvan Mine at Ammeberg	20
Metal		Boliden Metals AB	Smelter and refinery at Ronnskar	115
Lime		Euroc Mineral AB	Plants at Limham, Koping, and Storugns	250
Do.		Svenska Mineral AB	Plants at Rattvik and Boda	250
Limestone		Kalproduction Storugns AB (Nordkalk AB, 100%)	Mines at Gotland Island	3,000
Marble	cubic meters	Borghamnsten AB	Quarry at Askersund	15,000
Petroleum, refined	42-gallon barrels per day	Skandinaviska Raffinaderi AB	Refinery at Lysekil	210,000
Do.		BP Raffinaderi AB	Refinery at Gothenburg	100,000
Do.		Shell Raffinaderi AB	do.	82,000
Do.		AB Nynas Petroleum	Refineries at Gothenburg, Malmo, and Nynashamn	54,000
Silver, metal	kilograms	Boliden Metals AB	Smelter and refinery at Ronnskar	408,000
Do.	do.	North Mining Svenska AB	Zinkgruvan Mine at Ammeberg	25,000
Zinc, ore, zinc content		Boliden Mineral AB	Mines at Garpenberg, Laisvall, Langdal, and Renstrom	112
Do.		Zinkgruvan Mining AB (North Ltd., 100%)	Zinkgruvan Mine at Ammeberg	60

Do., do. Ditto.

THE MINERAL INDUSTRY OF SWITZERLAND

By Harold R. Newman

Mining, exclusive of industrial minerals for construction, played a minor role in Switzerland's economy. No metal mining took place in 2007 owing to the depletion of metalliferous ores. Metal processing—which was restricted to primary and secondary aluminum, secondary lead, pig iron, and steel—depended on imported raw materials or scrap. Industrial minerals produced by mining and processing included cement, gypsum, and lime, which were used domestically in construction.

Trade has been the key to prosperity in Switzerland. Swiss exports to the United States in 2007 were valued at about $17 billion, which included gem-quality diamond, $732 million; petroleum products, $161 million; copper, $11 million; and aluminum, $6 million. Swiss imports from the United States were valued at about $15 billion, and included bauxite and aluminum, $31 million; iron and steel products (semifinished), $24 million; nonmonetary gold, $21 million; and sulfur and nonmetallic minerals, $6 million. Switzerland's main trading partners were the members of the European Union (U.S. Census Bureau, 2007).

Production

Data on mineral production are in table 1.

Structure of the Mineral Industry

Switzerland's mineral industry was owned privately or by regional governments (Cantons). Regulatory control was administered by the Government. The 26 regional Cantons granted mining and processing licenses and directly operated electricity-generating facilities, gas utilities, and water resource facilities. The final authority for the mineral industry was vested in the Federal Council. Table 2 is a list of major mineral industry facilities.

Commodity Review

Metals

Aluminum.—Novelis Inc. of the United States announced that it would invest $32 million in the construction of a new casthouse at its Sierre rolling mill. The facility would house a multialloy ingot casting center based on the company's Novelis Fusion™ technology for simultaneously casting multiple alloy layers into aluminum ingots. The multialloy ingots will be rolled into sheet products and targeted for the automobile industry. The new casthouse was to have an initial production capacity of 70,000 metric tons and was expected to be operational in 2008 (Novelis Inc., 2006).

Industrial Minerals

Cement.—Holcim (Schweiz) AG was the leading cement, concrete, and gravel producer in Switzerland. Holcim operated seven cement plants and grinding stations and had a production capacity of 3.9 million metric tons per year (Holcim Ltd., 2007).

Diamond.—Switzerland was involved in the cutting and polishing of diamond and played a large role in international diamond trade activities. Lucerne was the world's third most important diamond trading center after London and Antwerp, Belgium. Exports of polished diamond in 2006, which was the latest year for which data were available, totaled 847,830 carats and were valued at $661,473,171. Exports of rough diamond in 2006 totaled 135,851,221 carats and were valued at $9,841,846,631. According to the latest data available, Swiss imports of polished diamond in 2006 totaled 481,724 carats and were valued at $592,006,741. Switzerland is a member of the Kimberley Process Certification Scheme (HRD Antwerp NV, 2007, p. 8).

Mineral Fuels

Natural Gas.—In 2007, the Trans Adriatic Pipeline project was launched by the Swiss energy company Elektrizitaets-Gesellschaft Laufenburg AG. The project would transfer natural gas from Iran and Azerbaijan to Europe and open up a new supply corridor for the transportation of natural gas from significant reserves in Iran, the Caspian Sea region, and Russia to Western Europe, especially Italy and Switzerland (Alexander's Gas & Oil Connections, 2007).

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TABLE 1
SWITZERLAND: ESTIMATED PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Thousand metric tons unless otherwise specified)

Commodity[3]		2003	2004	2005	2006	2007
METALS						
Aluminum:						
Primary	metric tons	43,538[4]	44,538[4]	44,458[r]	40,000[r]	40,000
Secondary	do.	186,930[4]	192,000	193,200[4]	190,000	190,000
Iron and steel, metal:						
Pig iron		100	--[r]	--[r]	--[r]	--
Crude steel		1,100	1,100[r]	1,158[4]	1,252[r, 4]	1,264[4]
Semimanufactures		700	700	700	700	700
Lead, refined, secondary	metric tons	8,000	9,000	8,000	9,000	9,000
INDUSTRIAL MINERALS						
Cement, hydraulic		3,613[4]	3,851[4]	4,022[4]	4,000	4,000
Gypsum		300	300	300	300	300
Lime		75	75	75	75	75
Nitrogen, N content of ammonia		29[4]	32[4]	30	30	30
Salt		562[4]	569[4]	566[4]	560	560
Sulfur, from petroleum refining	metric tons	3,000	3,000	3,000	3,000	3,000
MINERAL FUELS AND RELATED MATERIALS						
Petroleum refinery products:						
Liquefied petroleum gas	thousand 42-gallon barrels	3,640[4]	2,604[4, r]	3,000[r]	3,000[r]	3,000
Gasoline	do.	9,089[4]	9,793[4, r]	10,000	10,000	10,000
Distillate fuel oil	do.	14,126[4]	20,531[4, r]	20,000[r]	20,000[r]	20,000
Residual fuel oil	do.	4,891[4]	29,997[4, r]	30,000[r]	30,000[r]	30,000
Bitumen	do.	800	800	800	800	800
Refinery fuel and losses	do.	1,716[4]	15,178[4, r]	16,000[r]	16,000[r]	16,000
Total[5]	do.	34,262[4]	78,903[r]	79,800[r]	79,800[r]	79,800

[r]Revised. do. Ditto. --Zero.

[1]Estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Table includes data available through July 31, 2008.

[3]In addition to the commodities listed, a variety of crude construction materials (common clay, sand and gravel, and stone) were produced, but output was not reported.

[4]Reported figure.

[5]Total of listed products only.

TABLE 2
SWITZERLAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum		Novelis Inc. (Hindalco Industries Ltd., 100%)	Plant at Sierre	168
Cement		Holcim (Schweiz) AG (Holcim Group, 100%)	Plants (7) at various locations	4,300
Do.		Cementfabrik Holcim AG (Holcim Group, 100%)	Plant at Rekingen	700
Copper	metric tons	Schmelzmetall AG	Refinery at Gurtnellen	2,400
Gold	kilograms	Produits Artistiques de Métaux Précieux S.A. (MKS Finance SA, 100%)	Refinery at Castel San Pietro	425,000
Lead, secondary		Metallum AG	Smelter at Pratteln	13
Petroleum, refinery	barrels per day	Tamoil (Suisse) S.A. (Colony Capital LLC, 65%, and Government of Libya, 35%)	Refinery at Collombey	72,000
Do.	do.	Petroplus Refining Cressier S.A. (The Carlyle Group)	Refinery at Cressier	68,000
Salt		Saline de Bex S.A. (Canton of Vaud, 100%)	Saline plant at Bex	50
Steel		Stahl Gerlafingen AG (Swiss Steel AG, 100%)	Plant at Gerlafingen	650
Do.		von Moss Stahl AG (Swiss Steel AG, 100%)	Plant at Emmenbrucke	300

Do., do. Ditto.

THE MINERAL INDUSTRY OF TAJIKISTAN

By Richard M. Levine and Glenn J. Wallace

Historically, Tajikistan's mineral industry had mined mineral ores and produced mineral products, such as aluminum, antimony, arsenic, boron, celestite, cement, coal, construction materials, fluorspar, gold, lead and zinc, mercury, molybdenum, natural gas, petroleum, decorative and semiprecious stones, salt, silver, strontium, tin, tungsten, and uranium. Production of some of these mineral commodities had been greatly reduced or had ceased since the dissolution of the Soviet Union; the decrease was partially a result of loss of markets with the breakup of the Soviet Union and partially owing to a civil war that took place from 1992 to 1997 that disrupted a significant number of mineral production activities. In 2007, the Tajikistan Aluminum Co.'s (TALCO's) aluminum smelter [formerly the Tajikistan Aluminum Smelter (TadAZ)] was the country's only large-scale production enterprise in the mineral sector, although the country continued to produce a number of other metal products, such as antimony-mercury, copper-bismuth, gold, and lead-silver ores and concentrates, some industrial minerals, and mineral fuels, which included coal, natural gas, and oil.

Tajikistan was the world's third ranked producer of hydroelectric power after the United States and Russia. Hydroelectric power accounted for more than 75% of the country's total energy output. For the remainder, Tajikistan depended on electricity supplies from Turkmenistan, which were transmitted through Uzbekistan. Although the country's energy consumption per capita was among the lowest in the Commonwealth of Independent States (CIS), the country had suffered severe energy shortages, particularly during cold winter periods when waterflow from rivers is diminished (Najibullah, 2007, 2008).

Further development of hydroelectric energy was considered vital for future economic growth because of the country's need to import oil and natural gas from neighboring countries and given the high energy consumption of the country's aluminum smelter. Tajikistan imported a significant portion of its hydrocarbon fuel requirements from Uzbekistan. Other Central Asian countries, such as Kazakhstan and Turkmenistan, provided much of the remainder of the country's imported hydrocarbons (Embassy of Tajikistan to Pakistan, undated).

More than 400 mineral deposits that were deemed suitable to be considered for development had been explored. Tajikistan possesses significant resources of precious metals. According to the Academy of Science of the Republic of Tajikistan, 28 gold deposits had been identified that contain total estimated resources of 429.3 metric tons (t) of gold. The Bol'shoy Kanimansur deposit, which is located in the north of Tajikistan, was reportedly the largest silver deposit in the CIS and also one of the largest in the world. The resources of antimony in Tajikistan are also reportedly the largest in the CIS (Embassy of Tajikistan to Pakistan, undated).

Deposits of construction and decorative materials, such as granite, limestone, marble, and volcanic tuff, are located in the north of Tajikistan. Coal was mined at the Fan-Yagnob and the Shurab coal deposits. The Maykhura tungsten deposit, which is located 80 kilometers (km) north of Dushanbe in Central Tajikistan, was being prepared for development. The reserves of the Maykhura deposit reportedly could provide for profitable production of 150,000 metric tons per year (t/yr) of ore (Ibrokhim and Dzhanobilov, 2007; Embassy of Tajikistan to Pakistan, undated).

In the south of Tajikistan 46 km to the north of the city of Kulyaba, the Chilkultan and the Davgir sectors of the Chaltazh strontium deposit had been explored and were being prepared for development. The country had lead and zinc deposits in the north of the country at the Altyn-Topkan and the Bol'shoy Kanimansur deposits. At the Anzob mining and beneficiation complex, which mined the Dzhizhikrutskoye antimony-mercury deposit, the completion of exploration at lower horizons of the deposit could provide data on reserves that could serve as a basis for doubling of its capacity if the necessary economic factors support development (Ibrokhim and Dzhanobilov, 2007).

The south of the country has resources of billions of tons of salt. The country had explored and prepared the Yakarkharskoye boron deposit for development; the deposit is reportedly the largest boron deposit in the CIS. The boron is contained in datolite and danburite ores (Ibrokhim and Dzhanobilov, 2007).

Tajikistan has a number of silver and gold deposits. Total silver in ore resources were estimated to be 60,000 t and the largest deposit, the Bol'shoy Kanimansur, has about 38,000 t. Of the more than 30 known gold deposits, only a few have been prospected (Embassy of Tajikistan to Pakistan, undated).

Several potentially important coal deposits had been identified but had not yet been exploited. Although many deposits are suitable for open pit mining, they are found in mountainous regions, which are subject to extreme weather conditions and where transportation routes are difficult or nonexistent (Embassy of Tajikistan to Pakistan, undated).

Minerals in the National Economy

Tajiskistan's economy depended heavily on the production and export of aluminum and cotton, which together contributed about 9% of the gross domestic product (GDP) (World Bank, The, 2008). Exports of aluminum provided about 50% of the country's export revenues.

Production

In 2007, Tajikistan's economy grew at a rate of 7.8%. Growth in aluminum production—the country's major mineral commodity—was only 1.3% owing to power shortages (Nuttall, 2008). Coal production decreased by more than 20%. Reported production data for 2007 were not available for many mineral commodities at the time this report was written, but based on indicators that were available, gold production is estimated to have increased by more than 55%, and mine output of antimony is estimated to have decreased by more than 40% compared with output in 2006 (table 1).

Structure of the Mineral Industry

Besides the TALCO aluminum smelter, only a few metal mining enterprises were operating. These included the Anzob mining and beneficiation complex, which mined the Dzhikrutskoye antimony-mercury deposit, and the Adrasman mining and beneficiation complex, which developed copper-bismuth and lead-silver ores. The main output of Adrasman included concentrate with a lead content of 43% and a silver content of 5.943 grams per metric ton. The country also had enterprises engaged in gold mining and the extraction of coal, natural gas, and oil (table 2).

Commodity Review

Metals

Aluminum.—The TALCO aluminum smelter in Tursunzade had a design capacity to produce 517,000 t/yr of aluminum. It was 100% dependent on imported alumina. TALCO consumed nearly 40% of the country's total power output, employed 12,000 workers, and indirectly supported a community of 100,000 (Interfax Russia & CIS Metals and Mining Weekly, 2007). Almost all aluminum production was exported. An estimated 5,000 t/yr of aluminum was consumed domestically to produce kitchenware and other household necessities (Embassy of Tajikistan to Pakistan, undated).

In August 2007, officials from Tajikistan announced that they were canceling a 2004 agreement with the Russian aluminum company United Company RUSAL. According to the canceled agreement, RUSAL was to have invested about $2 billion to finish the Rogun dam and also was to modernize the TALCO aluminum smelter and participate in the construction of another nearby aluminum smelter. The President of Tajikistan attributed his Government's action to RUSAL's failure to honor its commitments. Construction of the Rogun dam, which is located about 110 km east of Dushanbe, had begun in 1976, but work had ceased following the dissolution of the Soviet Union. In 1993, a mudslide destroyed much of the work that had been done on the dam. The 2004 agreement between the Government of Tajikistan and RUSAL was intended to revive construction of the dam and to further the development of the country's aluminum industry. The dam and aluminum projects were interconnected, as Rogun was to supply the electricity needed to operate the aluminum smelters (EURASIANET.org, 2009).

Almost 3 years after the signing the deal, RUSAL still had not engaged in work on the dam or on the aluminum smelters. A dispute concerning the height of the dam was one factor that stalled the project—RUSAL wanted to decrease the height of the dam, which would have lessened its power-generating capacity. Tajikistan officials called for the dam to be constructed according to the original specifications, which would enable Tajikistan to export some of the electricity generated by the hydroelectric powerplant. Of greater significance in ending the deal may have been RUSAL's seeking a significant stake in TALCO, which the Government of Tajikistan resolutely refused (EURASIANET.org, 2009).

After cancellation of the agreement with RUSAL, Tajikistan sought to compete the dam on its own, but work was proceeding at a slow pace and the Government was seeking foreign investment funds to help finish the construction. The dam was also raising concerns in Uzbekistan (which was located downstream from the dam) that the dam could limit the amount of water available for irrigation (Trilling, 2009). Plans to expand the TALCO aluminum smelter in Tursunzade, which is located not far from the Uzbekistan border, also had aroused the opposition of Government officials in Uzbekistan, who took the position that an expansion of the aluminum plant would cause severe environmental harm to Uzbekistan (EURASIANET.org, 2007).

Lead and Zinc.—The China Global New Technology Export and Import company was investing in the renovation of the Altyn-Topkan mining and beneficiation complex in Sogdiyskaya Oblast. The company, which had purchased the complex at auction and obtained a license for its development, planned to mine lead-zinc ore to produce concentrate. The initial production capacity of the complex reportedly was 250,000 t/yr of lead concentrate and would be increased eventually to between 500,000 and 700,000 t/yr, and then to 1 million metric tons per year. Construction of the complex was expected to be completed in the beginning of 2009 (Metal Ukrainy, 2007).

The Altyn-Topkan mining enterprise was commissioned in 1954, and until 2000, ore that had been mined at Altyn-Topkan was processed at the Almalyk mining and processing enterprise in Uzbekistan, which had concessionary control of Altyn-Topkan. Almalyk had ceased mining at Altyn-Topkan in 1997 and turned control of Altyn-Topkan back to the Government of Tajikistan in 1999. At that time, production facilities at Altyn-Topkan were mothballed and remained so until the acquisition of the facility by China Global New Technology Export and Import (Metal Ukrainy, 2007).

Outlook

Tajikistan has significant mineral resources awaiting development, some of which could be used to supply markets in Asia. The country still suffers from a lack of infrastructure and, at times, severe energy shortages, which are impediments to mineral development. The development of needed infrastructure and hydroelectric power sources will be important factors in future mineral development. With the end of the civil war in the country in 1997, Tajikistan has been able to return to a period of relative peace. Nevertheless, the legacy of the civil war has left the country with a complex political economy that has constrained public sector performance, private sector investment, and social development. Development of mineral resources will depend on its ability to attract investors, which will require the country to raise investor confidence through implementing better governance and strengthening deficiencies in its legal and financial systems (World Bank, The, 2008).

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TABLE 1

TAJIKISTAN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity[2]		2003	2004	2005	2006	2007[e]
METALS						
Aluminum, primary		319,360	358,082	379,630	413,800	419,060 [3]
Antimony, Sb content of concentrate		3,000 [r, e]	4,069 [r]	4,073 [r]	3,480 [r]	2,000
Gold	kilograms	2,370 [r]	2,161 [r]	1,927 [r]	1,920 [r]	3,000
Lead, Pb content of concentrate[e]		-- [r]	-- [r]	400 [r]	-- [r]	--
Mercury, Hg content of concentrate[e]		30	30	30	30	30
Silver, Ag content of concentrate[e]	kilograms	5,000 [3]	5,000	5,000	5,000	5,000
INDUSTRIAL MINERALS						
Cement		166,300	193,600	253,100	281,500	300,000
Fluorspar[e]		9,000	9,000	8,500	8,500	8,500
Gypsum		15,300 [r]	57,000 [r]	8,500	8,500	8,500
Nitrogen, N content of ammonia[e]		15,300	44,900	45,000	35,000 [r]	25,000
Salt		--	59,495	65,992	52,459	52,000
MINERAL FUELS AND RELATED MATERIALS						
Coal		46,500	92,900	98,500	102,400	81,600 [3]
Natural gas	thousand cubic meters	32,800	35,600	29,300	19,900	19,000
Petroleum, crude		17,700	18,900	21,600	22,300	22,500

[e] Estimated; estimated data are rounded to no more than three significant digits. [r] Revised. NA Not available. -- Zero.

[1] Table includes data available through February 28, 2009.

[2] In addition to the commodities listed, Tajikistan produces a number of other mineral commodities for which information is inadequate to derive estimates.

[3] Reported figure.

TABLE 2

TAJIKISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Aluminum	TALCO aluminum smelter [formerly the Tajikistan Aluminum Smelter (TadAZ)]	Tursunzade	517,000
Antimony:			
Ore	Anzob mining and beneficiation complex	Dzhizhikrutskoye Sb-Hg deposit	700,000
Metal	Isfara hydrometallurgical plant	Isfara	500
Arsenic	Mosrif deposit	NA	NA

See footnotes at end of table.

TABLE 2—Continued
TAJIKISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Bismuth		Isfara hydrometallurgical plant	Isfara	500
Do.		Leninabad mining and beneficiation complex	Yuzhno-Yangikanskiy deposit	25
Bismuth, copper, fluorspar, gold, silver, zinc (ore processing)		Adrasman mining and beneficiation complex	Kanimansurskoye deposit	650,000
Boron		Yakarkharskoye deposit	Kuhistoni Badakhshon Province	NA
Coal		Fan-Yagnob hard coal deposits	Pyandzh region	50,000
Do.		Isfara hydrometallurgical plant	Isfara	300,000
Do.		Shurab brown coal deposit	Shurab region	NA
Copper-lead-zinc		Leninabad mining and beneficiation complex	Yuzhno-Yangikanskiy deposit	2,500
Dolomite		Yavan electrochemical complex	Pashkharvoskoye deposit	NA
Fluorspar, concentrate		Takob mining and beneficiation complex	Takob and Krasnye Kholmy deposits	60,000[3]
Gold:				
In ore	kilograms	Aprelevka joint venture	Aprelevka deposit	200
Do.	do.	Darvaz joint venture	Yak-Suyskoye deposit, Khatlon Province	2,000
Do.	do.	Tajikzoloto mining and beneficiation complex, Pamir Artel	Darvazy and Rankul placer deposits, placers in central and southern parts of country	5,000[3]
Do.	do.	Zerafshan Gold Co.	Dzhilau and Taror deposits, Sughd Province	2,500[3]
Ore processing	do.	Kansayskaya factory	Aprelevka, Burgunda, Kyzyl-Chek, and Shkol'noye deposits	165,000[3]
Do.	do.	Vostokredmet refinery	Chkalovsk	NA
Lead-zinc		Adrasman mining and beneficiation complex	NA	NA
Do.		Altyn-Topkan mining directorate (China Global New Technology Export and Import)	Altyn-Topkan deposit (mining ceased in 1997)	NA
Do.		do.	Pay Bulak deposit (mining ceased in 1997)	NA
Do.		Kansayskoye mining complex	Kara-Mazar region	NA
Do.		Takaeliyskiy metallurgical complex	NA	NA
Limestone		Dushanbe cement complex	Kharangonskoye deposit	NA
Loam		do.	Varzobskoye Ushchel'ye deposit	NA
Marble		Dal'yan Bolo deposit	Shakhristanskiy region	NA
Do.		Dashtak deposit	Darvaz region	NA
Do.		Jilikul deposit	Pendzhikent region	NA
Mercury		Anzob mining and beneficiation complex	Dzhizhikrutskoye deposit	150
Natural gas and petroleum:				
Natural gas	thousand cubic meters	Sixteen oil-gas deposits under exploration, which includes Ayritanskoye, Madaniyatskoye, and Ravatskoye	Fergana depression	200,000[3]
Petroleum		Beshtentyakskoye, Kichik-Belskoye, Shaambary, and Uzunkhorskoye deposits	Southern Tajik depression	200,000[3]
Salt		Ashtskiy plant	Kamyshkurganskoye deposit	NA
Do.		Khoja-Sartez, Samanchi, and Tanabchi deposits	NA	NA
Do.		Voseyskiy plant	Khodzha-Muminskoye deposit	NA
Do.		Yavan electrochemical complex	Tut-Bulakskoye deposit	NA
Silver	kilograms	Adrasman mining and beneficiation complex	Bolshoy Kanimansur deposit	15,000
Strontium, ore		Chaltash, Chilkutan, and Davgir deposits	Khatlon Province	180,000
Tin-tungsten		Tafkon deposit	NA	NA
Tungsten ore		Maykhura deposit	Central Tajikistan	150,000

[e] Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

[1] Table includes data and information available through March 31, 2009.

[2] Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and their locations.

[3] Capacity estimates are totals for all enterprises that produce that commodity.

The Mineral Industry of Turkmenistan

By Richard M. Levine and Glenn J. Wallace

Although Turkmenistan produces a wide range of industrial minerals, its major mineral resources are its oil and gas reserves, and the country is a leading regional natural gas producer. Turkmenistan has several of the world's largest gasfields, which include the Dauletabad, which was brought into production in 1982, and the Shatlyk, which was brought into production in the early 1970s. Turkmenistan had two oil refineries—the Turkmenbashi complex and the Seydi refinery.

The country's leading nonfuel mineral enterprises were the Arpaklenskiy barite-witherite enterprise, the Cheleken ozokerite enterprises, the Gaurdak sulfur plant, the Karabogazsulfate Association, the Kara-Kum sulfur plant, and the Oglanly bentonite mining enterprise. One of the leading enterprises that extracted chemical raw materials was the Karabogazsulfate Association, which recovered salts from the Kara-Bogaz Gol lagoon off the Caspian Sea. The association produced bischofite, Caspian Sea salt, epsomite, Glauber's salt, and sodium sulfate. In the western part of the country at the Boyadagskoye, the Cheleken, and the Nebitdag deposits, iodine-bromine brines were being extracted, then processed at the Cheleken and the Nebitdag iodine-bromine plants.

The country had discovered 149 gas and gas condensate deposits with total reported reserves of 5 trillion cubic meters of natural gas. Of these deposits, 139 were located onshore and had reported reserves of 4.6 trillion cubic meters and 10 were located on the Caspian Shelf and had reported reserves of 400 billion cubic meters. Fifty-four deposits with reported reserves of 2.6 trillion cubic meters and 11 deposits with reported reserves of 260 billion cubic meters were being prepared for development. Seventy-three deposits with reported reserves of 2 trillion cubic meters were under exploration, and 11 deposits with reported reserves of 140 billion cubic meters had been placed on hold. The majority of the country's reported natural gas reserves were located in the Dauletabad and the Shatlyk basins (Eder, 2007).

By the beginning of 2006, 34 oil deposits and 82 gas condensate deposits had been discovered in Turkmenistan, of which 20 oil deposits and 38 gas condensate deposits were under development. Four gas condensate deposits were being prepared for development, and exploration work was being conducted at 14 oil and 39 gas condensate deposits. The majority of oil reserves are located in the Southern Caspian oil and gas basin in the western part of the country (Eder, 2007).

Owing to a lack of adequate information about the country's oil and gas reserves and the lack of a complete international audit of reserves, the reserves numbers that have been published by a number of organizations can only be considered estimates. Furthermore, a large portion of the country still had not undergone intensive exploration (Eder, 2007).

Future development of the country's oil and gas sector will depend primarily on the development of offshore oil and gas resources in the Caspian Sea. According to Turkmenistan's Ministry of the Oil and Gas Industries and Mineral Resources, Turkmenistan has resources of 12 billion metric tons of oil and 6.2 trillion cubic meters of natural gas in the Caspian Sea at depths of between 2,000 to 7,000 meters (Eder, 2007).

Production

Data on mineral production are in table 1. In 2007, Turkmenistan increased production of its two major mineral products, natural gas and oil, by 9% each compared with production in 2006. Production data and other information regarding mineral production for most other mineral commodities have not been available for a number of years and production estimates in table 1 generally reflect past levels of production.

Structure of the Mineral Industry

All mineral production enterprises were state owned and all deposits were being developed by enterprises subordinate to the state and its ministries. Based on a law passed in 1992, foreign firms were permitted to establish joint ventures only with state-owned companies. This law was changed in late 2007 to allow foreign investors the right to fully or partially own enterprises, as well as to own movable property and real estate. Ownership rights can be purchased from individuals as well as from legal entities registered in Turkmenistan (Interfax Russia & CIS Metals and Mining Weekly, 2007).

The role of foreign firms in the country's oil and gas production was less than 10%, although attracting foreign investment and the participation of foreign firms would likely be a major factor in the country increasing production on the Caspian Shelf (Eder, 2007). Table 2 is a list of major mineral industry facilities in Turkmenistan.

Mineral Trade

Turkmenistan planned to increase gas exports in 2007 to 58 billion cubic meters in accord with intergovernmental agreements. Revenues from exports of natural gas and oil and oil products accounted for about 80% of Turkmenistan's merchandise exports as the country experienced a large inflow of revenue because of the high world market prices for oil. In 2006, Turkmenistan negotiated improved payment terms for its natural gas exports with Russia and Ukraine, which included eliminating barter settlements as well as an almost 50% increase in the export price. A 25-year gas export agreement signed with Russia in 2003 and a 30-year agreement signed with China in the spring of 2006 would likely enable Turkmenistan to maintain a steady stream of foreign exchange inflows (World Bank, The, 2007).

In 2006, Turkmenistan had two gas-export pipelines. One was a major pipeline route built in the Soviet era that connected to the pipeline network in Russia and through which the majority of Turkmenistan's gas was exported. The other was a much smaller pipeline built in the post-Soviet period that linked to the pipeline network in Iran through which Turkmenistan exported about 8 billion cubic meters of gas annually to Iran. In 2007, Turkmenistan was to export 50 billion cubic meters of gas to Russia. Turkmenistan's gas flowed directly only to these countries (Pannier, 2008).

On May 12, Kazakhstan, Russia, and Turkmenistan signed an agreement to construct a pipeline from Turkmenistan's Caspian shore to Russia through Kazakhstan. It would initially entail the reconstruction of the existing western branch of the Soviet-era Central Asia-Centre (CAC) pipeline, which would extend along the shore of the Caspian Sea and would transport Turkmenistan's gas to Russia by way of Kazakhstan. The reconstructed pipeline would have the capacity to transport 10 billion cubic meters per year. A new parallel pipeline would then be laid alongside it to boost the overall capacity.

On May 14, the U.S. Secretary of Energy said that this pipeline deal was not good for Europe, which needs to diversify its sources of energy. A week before the trilateral agreement on the pipeline was signed, the head of the state-owned Turkmengas company said the country was interested in diversifying its export routes and cited the possibility of constructing the Trans-Caspian Gas Pipeline (TCGP), which would be an extension of the South Caucasus Pipeline. At a press conference held after the trilateral summit, the President of Turkmenistan said that the TCGP was still on the agenda and that diversification of gas distribution could still be examined (Abdurasulov, 2007).

Commodity Review

Mineral Fuels

Natural Gas.—In 2007, natural gas production in Turkmenistan increased to 72.3 billion cubic meters, or by 9% compared with production in 2006. The state company Turkmengaz accounted for more than 80% of the country's natural gas production and also produced oil and gas condensate (Eder, 2007; Interfax Russia & CIS Oil and Gas Weekly, 2008). Natural gas production had fallen from a high of about 80 billion cubic meters per year in the 1980s to only 12 billion cubic meters in 1998 owing to the lack of permission to transport its gas to markets through the Russian pipeline network, which was the country's only available major route to export gas. The resolution of transport issues between Russia and Turkmenistan enabled Turkmenistan to increase its natural gas output (Eder, 2007).

The majority of the country's natural gas was produced in the southeastern part of Turkmenistan from the large Dauletabad-Donmez field, which produced about 40 billion cubic meters per year and which had resources initially estimated to be 4.5 trillion cubic meters. Potential increases in natural gas production were expected to come from a group of fields associated with the Caspian Shelf on the right bank of the Amu Dar'ya River and from the Yashlar–South-Iolotan group of fields, which includes the South-Yolotan deposit; this deposit has reserves reported to be 15 trillion cubic feet (more than 400 billion cubic meters) of natural gas and 17 million metric tons (Mt) of oil, making it one of the largest deposits of natural gas in Central Asia (Eder, 2007).

To fulfill its signed delivery agreements, Turkmenistan would need to take additional measures, such as make major new investments to accelerate oilfield and gasfield development and construct transport infrastructure (Interfax Russia & CIS Oil and Gas Weekly, 2007). In May, the chairman of Turkmengaz reported that the country's energy strategy was to increase gas production to 120 billion cubic meters per year in 2010 and then to more than triple production to 240 billion cubic meters per year by 2030. To achieve these goals, Turkmenistan would not only need to have adequately appraised its reserves, but also have the ability to attract foreign investment to develop deposits and to construct infrastructure to bring the gas to market (Hug, 2008).

Petroleum.—In 2007, the country had raised its oil and gas condensate production by 9% to 9.75 Mt compared with that of 2006 after it fell from between 6 and 7 million metric tons per year (Mt/yr) in the 1980s to about 4 Mt/yr in the mid-1990s. The country's major oil producer was the state company Tukmenneft'. Turkmenistan had an oil refining industry that was represented by the the Seydi oil refinery and the Turkmenbashi complex of oil refineries, which had a total combined capacity of 12 Mt/yr (Eder, 2007).

Outlook

Exports of natural gas could double in coming years as new pipelines are completed to improve links to China, Russia, and other countries, including Pakistan. The pipeline agreement that Turkmenistan signed with Kazakhstan and Russia is expected to be operational by 2010. This proposed pipeline could possibly supplant the proposed TCGP, which would have supplied European markets and bypassed the Russian pipeline network. Besides the TCGP, a number of other alternate routes have been proposed that would enable Turkmenistan to export gas through routes that bypass Russia. It is possible that construction of one or more of these pipeline routes is still feasible. In 2006, Turkmenistan signed an agreement with China to begin exporting about 30 billion cubic meters of gas annually to China by way of a proposed pipeline that could be operational by the end of 2009 (Zissis, 2006; Abdurasulov, 2007).

To fulfill all its signed contracts for gas delivery, Turkmenistan would have to increase its gas exports to 95 billion cubic meters in 2010 and to 135 billion cubic meters in 2020. Russia is expected to increase purchases of natural gas from Turkmenistan to 90 billion cubic meters per year after 2010 (Eder, 2007).

Turkmenistan's crude oil exports also could increase with increased oil production, with projections calling for crude oil exports to increase to 12 Mt in 2010 and 15 Mt in 2015. Projections called for crude oil production to increase to 19 Mt in 2010, 25 Mt in 2015, and to 30 Mt in 2020 (Eder, 2007).

To meet the projections by the chairman of Turkmengaz of almost doubling gas production to 120 billion cubic meters in 2010 and then more than tripling production to 240 billion cubic meters by 2030 would require the country to attract sufficient foreign investment. Turkmenistan stated that it was interested in broad international cooperation to implement large investment projects in Turkmenistan's sector of the Caspian Sea on a production-sharing agreement basis. Such projects would consist not only of developing gasfields and oilfields, but also constructing gas transport facilities, overhauling existing gas and oil wells, modernizing refining facilities, and supplying updated equipment and technology (Interfax Russia & CIS Oil and Gas Weekly, 2008).

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TABLE 1

TURKMENISTAN: ESTIMATED PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
INDUSTRIAL MINERALS						
Bentonite		1,600 [r]	1,500 [r]	1,400 [r]	2,000 [r]	2,000
Bentonite powder		250	250	250	250	250
Bischofite		100	100	100	100	100
Bromine	kilograms	150,000	150,000	150,000	150,000	150,000
Cement		450,000	550,000	650,000	1,000,000 [r]	1,500,000
Epsomite		NA	NA	NA	NA	NA
Ferrous bromide, 51% Br		85	85	85	85	85
Gypsum		1,700 [r]	1,600 [r]	1,580 [r]	3,000 [r]	3,300
Iodine		200,000	250,000	270,000	270,000	270,000
Lime		16,000	16,000	16,000	16,000	16,000
Nitrogen, N content of ammonia		150,000 [r]	200,000 [r]	220,000 [r]	250,000 [r]	270,000
Salt		4,300 [r]	4,500 [r]	4,800 [r]	5,000 [r]	5,200
Sodium sulfate		60,000	60,000	60,000	60,000	60,000
Sulfur		9,000	9,000	9,000	9,000	9,000
MINERAL FUELS AND RELATED MATERIALS						
Natural gas	million cubic meters	59,100 [3]	58,570 [3]	60,420 [r, 3]	66,300 [r]	72,300 [3]
Petroleum, crude		9,306,000 [3]	10,051,000 [3]	9,700,000 [3]	8,950,000 [r]	9,750,000 [3]

[r] Revised. NA Not available.

[1] Estimated data are rounded to no more than three significant digits.

[2] Table includes data available through February 28, 2009.

[3] Reported figure.

TABLE 2
TURKMENISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity
Ammonia	thousand metric tons	Maryzoat Association	Mary Region	400,000
Argillite	cubic meters	Keramzit plant	Yagmanskoye deposit	200,000
Barite-witherite		Arpaklenskiy mining enterprise	Arpaklen deposit	10,000
Do.		Kumytash deposit and other deposits	NA	NA
Bench gravel and loam:				
Bench gravel		Bezmeinskiy deposit	Near Ashkhabad	1,200,000
Loam		do.	do.	12,000
Bischofite, epsomite, Caspian Sea salt, Glauber's salt		Karabogazsulfate Association	Kara-Bogaz-Gol Lagoon, off the Caspian Sea	NA
Bromine		Cheleken plant	Cheleken Region	4,740
Do.		Nebitdag plant	Nebitdag Region	2,370
Cement		Bakharlinskiy cement plant	South of Kelyata train station	1,000,000
Do.		Bezmeinskiy cement plant	Kelyata	1,400,000
Clays:				
Bentonite		Oglanly Mine	Oglanly Region	100,000
Kaolin		Ashkhabad glass plant	Kyzylkainskoye deposit	80,000 [e]
Do.		Tuarkyrskoye deposit	250 kilometers southeast of Turkmenbashi	NA
Coal, oxidized		do.	do.	NA
Dolomite		Ashkhabad glass plant	Kelyatinskoye deposit	6,000 [e]
Gypsum		IA Turkmenmineral	Mukry, Tagorin deposits	300,000
Do.		Wastes from Gaurdak sulfur deposit	Gaurdak, Gora	400,000
Do.		Krasnovodsk Aylagy (anhydride) deposit	9 kilometers east of Turkmenbashi	160,000
Iodine		Cheleken plant	Cheleken Region	355
Do.		Nebitdag plant	Nebitdag Region	255 [e]
Limestone		Deposits:		
Do.		Gaurdak	4 kilometers northeast of Gaurdak	NA
Do.		Kara-Dzhumalakskoye	60 kilometers from Gaurdak	NA
Limestone, for facing materials		Charshanginskoye, Gaurdakskoye, Geok-Tepinskoye, Kaylyu, Krasnovodsk Aylagy (tuff and granite), and Tyuzmergenskoye deposits	NA	NA
Do.	cubic meters	Tagarinskoye deposit	8 kilometers from Gaurdak	1,000 [e]
Limestone, for filing stone	do.	Aeroport deposit	21 kilometers northeast of Turkmenbashi	2,000
Do.	do.	Bekdashskoye deposit	200 kilometers north of Turkmenbashi	5,000
Do.	do.	Dostluksoye deposit	230 kilometers southeast of Turkmenbashi	2,000
Do.	do.	Mukrinskoye deposit	60 kilometers southwest of Gaurdak	25,000
Natural gas	million cubic meters	Achakskoye, Dauletabad-Donmez, Gygyrlinskoye, Yolotan (South Yolotan-Osman), North and South Naipskiye, Shatlyk, and Yashlar deposits	Onshore in eastern and southwestern parts of country and offshore in Caspian Sea; Amu-Dar'ya and Murgab Basins; Dashoguzskiy, Lebapskiy, Maryyskiy deposits	90,000 [e, 3]
Natural pigment		Bakhchesu/Cheshme/Gadyn deposit	28 kilometers southwest of Serdar	NA
Ozokerite		Cheleken mining enterprise	NA	NA
Petroleum:				
Crude	thousand metric tons	Barsa-Gelmesskoye, Burunskoye, Cheleken, Gograndagskoye, Yolotan (South Yolotan-Osman), Kamyshldzhinskoye, Korturtepinskoye, Kum Dag, Kuydzhikskoye, Okaremskoye, and Yashlar deposits	Centered in Caspian plain in west Turkmenistan and in offshore oilfields to the west of Cheleken Peninsula in Caspian Sea	11,000 [e, 3]
Refined	do.	Facilities:	Locations:	
		Seydi oil refinery	Chardzhou Rayon	12,000 [3]
		Turkmenbashi complex of oil refineries	Turkmenbashi	

See footnotes at end of table.

TABLE 2—Continued
TURKMENISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity
Potash (sylvinite, carnallite)	Karlyuk deposit (experimental mine closed 1998)	25 kilometers from Gaurdak	NA
Do.	Karabil'skoye deposit	17 kilometers south of Gaurdak	NA
Quartz sand	Annauskoye, Babadurmazskoye, Bakhardenskoye, and Kelyatinskoye deposits	NA	NA
Rock salt	Gaurdak deposit	8 kilometers from Gaurdak	15,000 [e]
Do.	Khodzhaguymaskoye deposit	4 kilometers west of Gaurdak	NA
Do.	Kugitangskoye deposit	75 kilometers from Gaurdak	2,000 [e]
Do.	Uzun-Kudukskoye deposit	20 kilometers from Gaurdak	2,000 [e]
Salt	Kuulinskoye deposit	40 kilometers north of Turkmenbashi	650,000 [e]
Sand and gravel cubic meters	Dushaksoye deposit	NA	1,150,000
Do. do.	Kala-I-Morskoye deposit	NA	925,000
Do. do.	Kernayskoye deposit	NA	36,000
Do. do.	Kubatayskoye deposit	NA	740,000
Do. do.	Ufrinskoye deposit	NA	900,000
Sodium sulfate	Karabogazsulfate Association	Bekdash, Kara-Bogaz-Gol lagoon (off Caspian Sea)	400,000
Strontium (celesite)	Arikskoye deposit (mining ceased 1992)	Near Gaurdak	NA
Do.	Shakhtaminskoye deposit	do.	NA
Sulfur	Darvaza, Segli-Kar, and Kara-Kum sulfur plants	Kara-kum deposit (mining ceased 1962)	NA
Do.	Gaurdak plant	Gaurdak deposit (mining ceased 1997)	500,000 [e]
Do.	IA Turkmenmineral	Gora deposit	340,000
Do.	Kugitangskoye deposit	75 kilometers from Gaurdak	NA

[e] Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

[1] Table includes data and information available through March 31, 2009.

[2] Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

[3] Capacity estimates are totals for all enterprises that produce that commodity.

THE MINERAL INDUSTRY OF UKRAINE

By Richard M. Levine, Mark Brininstool, and Glenn J. Wallace

Ukraine was a major world producer of coal, ferroalloys, ilmenite, iron ore, manganese ore, and steel. The country's steel exports were of major importance on world markets. Other major mineral commodity exports were iron ore and ferroalloys. Ukraine had been a lesser producer of a number of other metallic mineral products, which included alumina, aluminum, cadmium, germanium, secondary lead, magnesium, mercury, nickel, rutile, uranium, secondary zinc, zircon, zirconium, and a large number of industrial minerals, which included dolomite, graphite, kaolin, limestone fluxes, potash, quartz, salt, soda ash, and a variety of building materials. The country has large coal reserves but only limited oil and natural gas resources (Poltavets and others, 2008). Ukraine is one of the world's leading energy transit countries and has large oil and gas pipeline networks that transport Russian and Caspian Sea oil and gas across its territory.

Minerals in the National Economy

In 2007, Ukraine's metallurgical sector had its best year in 12 years according to a statement by the Minister of Industry, based primarily on the volume of production of metallurgical products. Not only did the volume of production increase, but so too did investment in new equipment. In 2007, investment in producing 1 metric ton (t) of steel was $31, which was on the level of advanced European economies. Earlier, Ukraine had averaged only between $10 and $15 of investment per metric ton and had exceeded $25 per metric ton only in 2005. Profitability in the metallurgical industry in 2007 reached 18.9% compared with 14.09% in 2006 (Metall Ukrainy, 2008c). As of January 1, 2007, direct foreign investment (DRI) in Ukraine totaled almost $26.9 billion, of which DRI in metallurgy was about $1.52 billion; the extractive industries, about $1.02 billion; the production of nonmetallic mineral products, about $539 million; and the production of coke and refined oil products, $223 million (Interfax Russia & CIS Statistics Weekly, 2008a).

The steel industry was a major component of Ukraine's economy and accounted for between 5% and 6% of the gross domestic product (GDP) and 34% of export revenues. It employed about 420,000 people, which constituted about 10% of industrial employment and about 2% of total employment. Energy demand in Ukraine was characterized by high energy intensity owing to the large share of heavy industry in the country's economy and the industry's low level of energy efficiency; these factors made Ukraine's economy highly vulnerable to increases in oil and gas prices (World Bank, The, 2005).

Production

In 2007, the GDP increased by 7.3% compared with that of 2006, and the value of industrial production increased by 10.2% compared with that of 2006 (Interfax Russia & CIS Statistics Weekly, 2008b, c). The value of output in the mineral extractive industries increased by 2.7%; the value of mineral fuel output decreased by 2%, but the value of nonfuel mineral output increased by 8.8%. The value of output in the metallurgical sector increased by 8.3% compared with that of 2006, the value of nonmetallic mineral output increased by 16.9%, and the value of coke and oil products increased by 3.3% (Interfax Russia & CIS Statistics Weekly, 2008c). The volume of production in the ferrous metals sector increased in response to the increase in global demand and metals prices. Production of iron ore increased by almost 4%; pig iron, by 8%; finished rolled steel, by almost 10%; and coke, by about 5% compared with output in 2006. The value of mined output increased by 9.4% for metallic ores, by 2.8% for coal and peat; and by 5.2% for oil and gas (Interfax Russia & CIS Statistics Weekly, 2008c).

Structure of the Mineral Industry

The country's iron ore and steel sector included 14 mining enterprises. It also included 15 iron and steel works and plants and 3 ferroalloy plants, as well as 20 metalware plants, 15 tube producing enterprises, 13 refractory production plants, and 12 byproduct coke plants (National Exhibition of Ukraine in the USA, 2006). Ukraine was engaged in privatizing major enterprises in its ferrous metals sector although the process at times had been marred in some cases by disputes and a reputed lack of transparency (Kiev Ukraine News Blog, 2007).

Mineral Trade

Europe was the destination of about one-third of Ukraine's exports, and about one-fourth of Ukraine's exports went to Russia and other countries of the Commonwealth of Independent States (CIS). Steel constituted nearly 40% of the country's exports. Ukraine imported almost 80% of its oil and 77% of its natural gas. Russia was Ukraine's main supplier of oil and Russian firms owned and (or) operated the majority of Ukraine's refining capacity (U.S. Department of State, 2008). In 2007, Ukraine reoriented its steel exports from countries in Asia to countries in the Middle East and to Turkey because China had made significant inroads into the Asian steel markets that had been importing steel from Ukraine. In 2007, iron ore exports increased by 4.7% compared with that of 2006 to 20.821 million metric tons (Mt) and exports of iron ore concentrate increased by 19.8% to 4.788 Mt. Pellet exports increased by 3.6% to 8.568 Mt. However, exports of agglomerate decreased compared with that of 2006 by 2.7% to 7.157 Mt. The main factor inhibiting iron ore exports, according to Ukrrudprom (a company made up of Ukrainian iron ore producers), was the tariff rate on rail transport (Metall Ukrainy, 2008a).

Natural gas imports, which were brokered through the intermediary company RosUkrEnergo (RUE), came from Kazakhstan, Russia, Turkmenistan, and Uzbekistan; gas was delivered through a pipeline system that was owned and controlled by OAO Gazprom of Russia. Ukraine controlled the gas pipelines on its territory; these pipelines were used to transit Russian gas to Western Europe. Tensions between Ukraine and Russia ostensibly concerning the price that Ukraine would pay for Russian gas supplies led to Russia's decision to cut off gas supplies for 3 days in January 2006 and 3 days in March 2008 (U.S. Department of State, 2008).

A large amount of oil and natural gas destined for the European Union (EU) and southeastern Europe was transported through Ukraine, including about 23% of the EU's oil imports and 46% of the EU's gas imports. Ukraine's trunk gas transport system was state owned and was the main transit route for Russian gas exports to Europe.

In early 2006, Russia began to increase the natural gas prices that it charged Ukraine toward prices charged in Western Europe. Ukraine claimed that the proposed almost fourfold price increase was politically motivated because of the "Orange Revolution" that had occurred in Ukraine and the country's election of a President perceived to be more politically oriented towards the West than towards Russia. Russia began cutting gas supplies to Ukraine in an energy price dispute that became a major political dispute. This crisis created fears that Russian exports to Western Europe could be affected, as most of the gas from Russia destined for Europe was channeled through Ukrainian pipelines and Ukraine was capable of diverting these supplies for its own needs. Russia insisted that there would be no disruption of supplies to Europe (BBC News, 2006).

In 2006, an agreement was reached between Russia and Ukraine that set the gas import price initially at 64% higher than the prevailing price. Ukraine's gas sector had been controlled by National Joint Stock Company (NJSC) Naftogaz Ukraini, a state-owned enterprise. Naftogaz Ukraini was Ukraine's largest firm in terms of assets and supplied nearly all Ukraine's gas consumers through 2005. Beginning in 2006, however, as a result of the new gas contract between Ukraine and Russia, Ukraine's gas imports were to be handled by UkrGasEnergo (UGE), which was a joint venture between Naftogaz Ukraini and privately owned RUE. RUE provided gas at the Ukraine-Russia border to UGE, which sold and distributed it to industrial consumers and to heating and power companies. The household market remained under the control of Naftogaz (Kramer, 2008).

On October 2, 2007, Russia's Gazprom announced that it could begin to reduce natural gas supplies to Ukraine within the month if Ukraine did not begin to take action to pay the debt of more than $1.3 billion that it owed Gazprom for previous deliveries (OAO Gazprom, 2007b). The announcement came after the September 30 Parliamentary elections when competing factions were striving to form a coalition government and select a Prime Minister (Reuters, 2007).

On October 9, an agreement on repayment of the debt was reached. Under the conditions of the agreement, Ukraine reportedly would give gas transit intermediary RUE 8 billion cubic meters of gas from Ukrainian storage facilities and Naftogaz Ukraini and UGE would pay $929 million to settle the remainder of the debt by November. (Press reports, however, have varied on the amount of gas that Ukraine would supply RUE and the amount of money that Ukraine would pay, and the amounts quoted may not reflect the actual amounts.) RUE would use the profits from the sale of the gas and the direct payment in gas to pay Ukraine's debts to Gazprom (Interfax Russia & CIS Oil and Gas Weekly, 2007b). On November 6, a Gazprom press release stated that RUE had fully completed its responsibilities with regard to the agreement on the settlement of the debt, which could be interpreted as meaning that the entire amount of the debt to Gazprom had been cleared (OAO Gazprom, 2007a).

In December, Gazprom and Naftogaz Ukraini agreed to increase the price at which Ukraine would purchase gas to $179.50 per 1,000 cubic meters beginning in 2008 from $130 per 1,000 cubic meters in 2007. The transit price that Ukraine would charge Gazprom also increased to $1.70 from $1.60 per 1,000 cubic meters per 100 kilometers, and Naftogaz Ukraini agreed to transit 3.4% more gas for Gazprom in 2008 (Interfax Russia & CIS Oil and Gas Weekly, 2007a). The price increase was mainly attributed to the increased costs of obtaining gas from Gazprom's Central Asian suppliers.

Commodity Review

Metals

Aluminum.—Ukraine's aluminum industry consisted primarily of the Nikolayev alumina refinery and the Zaporozh'ye aluminum smelter (ZALK). The Nikolayev alumina refinery had increased production from 2000 through 2007 by about 36% to 1.5 Mt from 1.1 Mt. The Zaporozh'ye aluminum smelter was built in 1933. It became part of Russia's Siberian Urals Aluminum Co. (SUAL) in 2004 and then part of United Company RUSAL in 2007 when the merger of SUAL and RUSAL of Russia and the alumina assets of Glencore International AG of Switzerland was completed. A large portion of the smelter's output was sold domestically to enterprises in the machine manufacturing sector. The main issue facing ZALK was obtaining an adequate supply of affordable energy. Prices for energy in Ukraine had risen to the extent that the director of the smelter stated that his enterprise could not remain competitive unless the Government lowered the price that it had set for ZALK's energy supplies (Metall Ukrainy, 2007). According to a report of a state program to develop the mining and metals sector for 2011, the Government planned to construct a plant at the Zaporozh'ye aluminum smelter to produce up to 9,600 metric tons per year (t/yr) of foil and 16,000 t/yr of strips. Ukraine was also engaged in designing a new aluminum smelter with a capacity of 100,000 t/yr (Interfax Russia & CIS Metals and Mining Weekly, 2007e).

Iron and Steel.—In 2007, Ukraine's production of crude steel decreased to about 42.8 Mt, and production of finished rolled steel increased by 9.5% to about 24.5 Mt. Projections for 2008 called for crude steel output to increase to 46 Mt; production of pig iron was projected to increase to 38.3 Mt compared with 35.6 Mt in 2006. To meet these production targets, steelmakers in Ukraine would need an additional 6.1 Mt/yr of iron ore, which would necessitate importing an additional 3.9 Mt of iron ore and receiving an additional 1 Mt or iron in material from domestic mines, including an additional 1.1 Mt of sinter, 600,000 t of pellets, and 400,000 t of iron ore concentrate. By the end of 2007, it was evident that supplies of iron ore and coke could become tight in the coming year (Metall Ukrainy, 2008c). The steel industry planned to maintain exports at no less than the 2007 level and hoped that exports could increase by as much as 12% to 20% (Interfax Russia & CIS Metals and Mining Weekly, 2008b).

The country's major steel producing enterprises each produced more than 4 Mt/yr of steel, with some producing more than 7 Mt/yr. Of the total volume of steel produced in 2006 (the latest year for which data were available), 51.7% was produced by oxygen converter furnaces, 44.6% in open-hearth furnaces, and 3.7% in electric arc furnaces (EAF), which was the same ratio as in 2005 (Kharakhulakh, 2007). Ukraine's steel industry was undergoing a major transformation as major mills invested to modernize production facilities to achieve improved operational and environmental performance.

The steel industry was dominated by large producers, and switching to EAF for steel production was a difficult process, in part because the country's supply of steel scrap was quite limited. An increase in scrap availability could take place if depreciation rates on capital stock were accelerated and if the amount of scrap available from automobiles increased with increased car ownership. Plans called for the introduction of more continuous casting of steel, which was a process used to make only 30% of the steel produced (Krivchenko and others, 2007)

In 2008, the steel industry planned to increase its investment in construction and modernization by 28% compared with its investment in 2007. In 2007, the steel industry increased its investment in construction and modernization by 57.3% compared with its investment in 2006. Steel mills increased the value of output by 32.4% compared with that of 2006, but operating margins slipped slightly because of the higher cost of inputs. Production costs were projected to continue to increase significantly and profit margins were expected to continue to decrease. Only about one-half of the steel mills were envisioned to be able to operate profitably as production costs increase, which could result in a decrease in tax revenues paid to the Government by the industry (Interfax Russia & CIS Metals and Mining Weekly, 2008d).

Iron Ore.—In 2007, Ukraine's iron ore mines increased their output of crude ore by more than 5% to about 78 Mt. Pellets output increased by 1.5 Mt to about 22.4 Mt. Sinter production remained level at 47.4 Mt. A continuing issue remained the price at which iron ore enterprises were marketing their supplies to the country's metallurgical industry, which involved problems in relations between financial and industrial groups and quality to price issues (Interfax Russia & CIS Metals and Mining Weekly, 2008b). In response, the metallurgical enterprises were increasing imports and the iron ore enterprises were increasing exports, although this solution did not resolve marketing issues for the iron ore mining enterprises. At yearend, iron ore mining enterprises had a record 2.5 Mt of ore stockpiled in warehouses in Europe where their main consumers were located. The iron ore mining industry was looking to China to further expand its export markets (Metall Ukrainy, 2008e).

A basic problem that faced the iron ore mining sector was the high cost of production, including high energy consumption coupled with a low ore grades and difficult geologic conditions for mining at greater depths. Because of these circumstances, the industry was at a disadvantage in competing on world markets. About 70% of Ukraine's output of iron ore was consumed by domestic steelmakers that were mainly oriented towards exporting their output. Changes in Government policies beginning in 1999 stimulated greater investment in renovating and reequipping mining enterprises and made it possible for Ukraine's iron ore mining sector from 2000 onward to increase production annually; as a result, iron ore output had doubled since 1999. A significant factor in the revival of the iron ore sector was the formation of the conglomerate Ukrrudpom in 2004, in which up to 80% of all production capacity for mining and processing iron ore was concentrated (Kolosov, 2007).

The iron ore mining sector had been able to raise the quality of its products, although the quality was still low by world market standards. Raising its standards enabled the sector to maintain its level of exports at about 30% of output, despite increasing global competition. Nevertheless, unless further improvements in product quality are achieved, Ukraine would be at an increasing disadvantage in marketing its output on world markets. The iron ore industry's attempt to maintain its growth in output by mining large quantities of relatively low-grade ore had resulted in the industry causing major environmental problems because of the large volume of waste generated (Kolosov, 2007).

Manganese.—Ukraine was the leading producer of manganese ore in the CIS. Ukraine's two manganese producing enterprises—the Marganets and the Ordzhonikidze mining and beneficiation enterprises—were owned by the PrivatBank Group, which also controlled the Stakhanov and Zaporozh'ye ferroalloys plants. The PrivatBank also controlled the Australian manganese mining company Consolidated Minerals, as well as Ghana Manganese Company, Ltd. Ukraine had 75% of the manganese reserves of the CIS. Explored reserves prepared for development were reportedly 2.26 billion metric tons (Gt) that have an average manganese content of 23.1% (Goshovskiy, 2007). Increases in manganese ore production were not projected for 2008 as ferroalloy producers were preferring instead to use imported ore and stocks of domestically produced ore (Metall Ukrainy, 2008b).

In 2007, Ukraine decreased production of silicomanganese by 6.4% to 1,281,000 t. In 2008, the Ukrainian Ferroalloys Production Association planned to increase production of silicomanganese at the country's ferroalloys plants by between 10% and 15% compared with between 1,341,100 and 1,402,000 t in 2007. An increase in ferromanganese production was not foreseen as the emphasis was to be placed on improving product quality rather than on the volume of production (Metall Ukrainy, 2008b).

In 2007, the Nikopol ferroalloys plant, which was controlled by the Interros Group of Russia, increased ferroalloys production by 16.5% to 1.04 Mt, which included increasing production of silicomanganese by 22.3% to 768,100 t and ferromanganese by 4.5% to 272,000 t (Interfax Russia & CIS Metals and Mining Weekly, 2008a). From January to October 2007, the Zaporozh'ye ferroalloys plant, which was the country's leading producer of medium- and high-carbon ferromanganese, increased ferroalloys production by 1.2% compared with the same period in 2006; the production of silicomanganese was down by 4.7% year on year and the production of ferromanganese was down by 9.6%. Production of ferrosilicon at Zaporozh'ye increased by 34.2% compared with production in the same period of 2006. Zaporozh'ye was planning to invest in 2008 to upgrade facilities to improve environmental effects that would include reducing emissions and increasing recycling (Interfax Russia & CIS Metals and Mining Weekly, 2008e).

Mineral Fuels and Related Materials

Coal.—In 2007, coal production in Ukraine decreased by about 6% to 75.437 Mt of raw coal. Metallurgical coal production decreased to 28.296 Mt from 30.145 Mt, or by more than 9% compared with production in 2006, but steam coal production increased by almost 11% to 50.112 Mt (Interfax Russia & CIS Metals and Mining Weekly, 2008c). Ukraine's energy strategy for the period to 2030, which was approved by the Government in 2006, called for increasing annual coal output to 130.3 Mt by 2030. Production was projected to increase in 2008 as approximately 50 new coal faces were to be commissioned by yearend 2007 (Interfax Russia & CIS Metals and Mining Weekly, 2007a, i). Ukraine was experiencing shortages of metallurgical coal. In 2007, Ukraine imported 7.3 Mt of coking coal from Russia and about 2 Mt from other countries, and the country projected that it would import 7 Mt of coking coal in 2008, which included 2 Mt from Canada and the United States (Interfax Russia & CIS Metals and Mining Weekly, 2008c).

Ukraine's coal sector was mostly state owned, although Government participation was declining. The country's coal mines were subject to chronic financial distress and only limited efforts had been made to improve performance (International Monetary Fund, 2007). During the past 10 to 15 years, Ukraine's coal industry had undertaken measures to counter negative tendencies in the sector, but these measures were not considered to have been successful. The majority of coal mines were not profitable and required Government support. In 2008, the Coal Industry Ministry planned to finish work on closing 14 underground mines. Between 1996 and 2007, 24 coal mining enterprises shut down mines (Metall Ukrainy, 2008d).

Despite a large number of mines, production was highly concentrated, with about 20% of the mines producing almost 70% of the output. Although Ukraine was among the world's leading coal mining countries, labor productivity in the coal sector was between three and eight times lower than in Canada, Germany, Poland, Russia, and the United States (Poltavets and others, 2008).

For the past 15 years, the lack of success of the attempted solutions to the economic distress experienced by the coal industry was attributed to a high level of inertia, a lack of operating capital, and the long time period required for investment to result in increased production. Mining operations in Ukraine's major coal basin [the Donets Basin (Donbas)] have had to deal with a number of particularly complex issues, which include very deep mines with narrow coal seams and dangerously high levels of methane. Several coal mines that had been privatized as stock companies, however, were profitable even though they had to deal with the same difficult mining conditions (Poltavets and others, 2008).

As of January 1, 2005, Ukraine's economic (balansovye) reserves (which were calculated according to the reserve classification system used during the Soviet period and later by many of the Soviet Union's successor states) were reportedly 8.704 Gt, of which 6.501 Gt was classified as industrial reserves. Metallurgical coal made up 54% of the total industrial reserves, and steam coal, 46%. Industrial reserves were considered adequate for 65 years at current domestic consumption rates. Production, however, was more than 20% below domestic consumption. Explored reserves in Ukraine were reportedly about 18 times larger than industrial reserves and were reportedly 117 Gt (Poltavets and others, 2008).

Ukraine's Coal Industry Ministry planned to attract investors to develop deposits in the Dnepr brown coal basin, according to an investment proposal that it posted on its Web site on August 15, 2006. The proposal called for developing two deposits—the Aleksandriiskoye deposit, which has brown coal reserves reported to be 485 Mt, of which 63 Mt was considered suitable for open pit development, and the Verkhnedniprovskoye deposit, which has reported reserves of 236 Mt, for which the explored sections were considered suitable for open pit development. The Ministry calculated that these deposits had the potential to produce between 5 and 6 million metric tons per year (Mt/yr) of brown coal by open pit mining. Mines at the deposits were projected to come onstream in 2 years once development begins (Interfax Russia & CIS Metals and Mining Weekly, 2007d).

Petroleum.—In 2007, production of crude oil and condensate decreased by 1.9% to 4.428 Mt. Kiev-based OJSC Ukrnafta, which is a subsidiary of Naftogaz Ukraini, was the country's leading oil producer. In 2008, Ukraine was planning to increase extraction of crude oil and gas condensate by 1.63% to 4.5 Mt, according to the Fuel and Energy Ministry (Government Portal, 2008).

Uranium.—In December 2006, the Ukrainian Government passed a resolution to create the conglomerate Ukratomprom to consolidate nuclear power production. Ukratomprom was to be composed of a number of companies and mining enterprises, and its operations would be run by the national atomic energy company, Energoatom, which was made part of Ukratomprom (Interfax Russia & CIS Metals and Mining Weekly, 2007g). Ukraine planned to increase uranium oxide output from 800 t in 2006 to 1,000 t by 2010, and 2,500 t in 2015. Ukraine was planning to increase uranium oxide production to 5,900 t by 2025 and to 6,400 t by 2030 (Interfax Russia & CIS Metals and Mining Weekly, 2007c, h, j).

Ukraine reportedly was mining only 30% of the uranium it needed for domestic nuclear power generation. The Vostochny mining complex (VostGOK), which was located in Zheltye Vody in the Dnipropetrovsk region, was the country's only uranium mining enterprise. VostGOK was mining the Michurinskoye, the Tsentralnoye, and the Vatutinskoye deposits in the Dnipropetrovsk and the Kirovohrad regions, where 50% to 60% of the reserves had been depleted. Ore was processed at VostGOK's Zheltye Vody plant in Zhetlye Vody (Interfax Russia & CIS Metals and Mining Weekly, 2007h).

Planned production increases were linked to the development of the Novokonstantinovskoye field in the Kirovohrad region. Uranium production at the Novokonstantinovskoye deposit was scheduled to commence in 2008. Initial production would be 100 t of uranium oxide, and production would be increased to 500 t by the end of 2009; full capacity of 1,500 t would be achieved in 2013 (Interfax Russia & CIS Metals and Mining Weekly, 2007j). Russian firms would participate with Ukraine to meet the needs of Ukraine's nuclear power industry for uranium development and processing (Interfax Russia & CIS Metals and Mining Weekly, 2007f). Ukraine declassified data on nine uranium deposits in an effort to attract foreign investment to develop these deposits (Interfax Russia & CIS Metals and Mining Weekly, 2007b).

Outlook

Ukraine's steel industry was a mainstay of its economy and a major source of export revenues. Ukraine, in an effort to remain competitive on the international steel market, may attempt to have its steel mills switch from costly energy-intensive technologies to technologies that reduce energy usage and costs and improve the quality of steel produced. In part, this could entail replacing open-hearth furnaces with oxygen converters and EAF and greatly increasing the percentage of steel produced with continuous casting at existing enterprises, as well as at any new facilities (Krivchenko and others, 2007).

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TABLE 1
UKRAINE: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	2003	2004	2005	2006	2007
METALS					
Alumina	1,434,050	1,562,170	1,632,020	1,671,620	1,700,000 [e]
Aluminum:					
Primary	113,640	113,151	114,224	112,961 [r]	113,437
Secondary	130,000	130,000	130,000	130,000	130,000
Total	243,640	243,151	244,224	242,961 [r]	243,437
Cadmium, metal[e]	25	25	25	25	25
Gallium[e]	13	14	15	15	15
Germanium[e]	20	20	20	20	20
Gold[e]	500 [r]	500 [r]	500 [r]	500 [r]	500
Iron and steel:					
Iron ore, marketable:					
Gross weight	62,497,600	65,550,000	68,569,600	74,000,000	77,900,000
Fe content[e]	34,300,000	36,000,000	37,700,000 [2]	40,700,000	42,800,000
Metal:					
Pig iron	29,570,000	31,060,000	30,747,000	32,926,000	35,600,000
Ferroalloys:					
Blast furnace:[e]					
Ferromanganese	85,000	79,000	30,000	26,700 [r]	28,400
Spiegeleisen	5,000	5,000	5,000	4,450 [r]	4,730
Electric furnace:					
Ferromanganese	250,000 [e]	375,990	359,000	373,000	368,000
Ferronickel[e]	--	60,000 [r]	60,000 [r]	90,000 [r]	90,000
Ferrosilicon	250,000 [e]	248,060	228,000	169,000 [r]	218,000
Silicomanganese	740,000 [e]	1,060,000	1,046,000	1,168,000	1,281,000
Other[e]	25,000	25,000	25,000	22,200 [r]	23,700
Total	1,360,000 [e]	1,853,050 [r]	1,753,000 [r]	1,850,000 [r, e]	2,010,000 [e]
Steel:					
Crude	36,900,000 [e]	38,738,000	38,636,000	42,899,000 [r]	42,830,000
Finished, rolled	22,500,000	23,200,000	22,180,000	22,387,000	24,510,000
Pipe	2,054,000	2,034,000	2,293,000	2,759,000	2,800,000
Lead, refined, secondary	13,000 [r]	15,000 [r, e]	61,400 [r]	56,300 [r]	62,000
Magnesium, primary[e]	3	3	2,000	2,200	2,500
Manganese ore, marketable:					
Gross weight	2,590,900	2,362,000	2,260,000	1,606,400	1,719,600
Mn content[e]	880,000	810,000	770,000	546,000 [r]	580,000
Nickel:[e]					
Mine output, Ni content of laterite ore	2,000	2,000	6,000	12,000	12,000
Ni content of ferronickel	--	12,000	14,000	18,000	18,000

See footnotes at end of table.

TABLE 1—Continued
UKRAINE: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
METALS—Continued						
Titanium:						
Ilmenite concentrate:						
Gross weight		420,500	370,000 [e]	375,000 [e]	470,000	500,000
TiO_2 content, 61%[e]		257,000	226,000	229,000	287,000	305,000
Rutile concentrate, 95% TiO_2[e]		60,000	60,000	60,000	60,000	60,000
Metal, sponge		6,934	7,497	8,397	9,997	9,745
Zirconium concentrates[e]		35,000	35,000	35,000	35,000	35,000
INDUSTRIAL MINERALS						
Bromine	thousand kilograms	1,324 [r]	1,878 [r]	3,138 [r]	700 [e]	700 [e]
Cement		8,923,000	10,635,000	12,183,000	13,732,000	15,000,000
Clays:						
Ball clay		--	--	118,000	294,000	652,000
Bentonite[e]		300,000	300,000	300,000	300,000	300,000
Kaolin		169,900 [r]	202,300 [r]	216,600 [r]	251,000	244,000
Diamond, synthetic[e]	carats	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000
Feldspar		NA	48,800 [r]	63,930	67,313 [r]	76,305
Graphite		11,000 [r]	10,960 [r]	10,400 [r]	5,800 [r]	5,800 [e]
Gypsum		264,000	337,000	380,600	375,900	741,580
Nitrogen, N content of ammonia[e]		3,900,000	3,900,000	4,300,000 [2]	4,200,000	4,200,000
Potash, K_2O equivalent		10,000 [r, e]	10,100 [r]	13,100 [r]	8,100 [r]	11,900 [e]
Salt		3,863,000	4,393,000	4,811,000	5,996,000	5,548,000
Soda ash[e]		656,000 [2]	650,000	700,000	700,000	700,000
Sulfur, native[e]		142,000	136,000	139,000 [r]	133,000 [r]	135,000
Sulfuric acid		1,113,000	1,425,000	606,000	1,493,000	1,660,000
Vermiculite		60,000	62,000	64,000	65,000	65,000 [e]
MINERAL FUELS AND RELATED MATERIALS						
Coal, raw:						
Anthracite	thousand metric tons	14,427	18,295	16,204	13,444 [r]	13,000 [e]
Bituminous	do.	63,866	62,100	58,000	66,600 [r]	62,255
Lignite	do.	950	3,000	355	231 [r]	182
Total	do.	79,243	83,395	74,559	80,275 [r]	75,437
Marketable	do.	59,800	59,400	60,400	61,439 [r]	58,739
Coke		19,300,000	18,858,000	21,999,000	19,200,000	20,143,000
Natural gas	cubic meters	18,600,000	20,400,000	20,788,000	21,094,000 [r]	21,104,000
Peat, horticultural use and fuel use		559,000 [r, e]	544,000 [r]	639,000 [r]	462,000 [r]	395,000
Petroleum:						
Crude and gas condensate:						
As reported		3,975,000	4,179,000	4,414,000	4,506,000 [r]	4,459,000
Converted[e]	42-gallon barrels	29,200,000	30,700,000	32,400,000	33,100,000 [r]	32,800,000
Refinery products		21,900,000	22,000,000	18,400,000	14,384,000 [r]	13,910,000
Uranium:						
U content[e]		678 [r]	678 [r]	678 [r]	678 [r]	717
U_3O_8 content		800 [r]	800 [r]	800 [r]	800 [r]	846

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. NA Not available. -- Zero.

[1] Table includes data available through February 28, 2009.

[2] Reported figure.

TABLE 2

UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity		Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Alumina		United Company RUSAL:[3] Nikolayev refinery	Mykolayivs'ka Oblast'	800,000
Do.		Zaporozhye refinery	Zaporiz'ka Oblast'	245,000
Aluminum, primary		Zaporozhye smelter	do.	120,000
Coal:				
Hard	thousand metric tons	Donets coal basin (about 225 mines that produce more than 90% of Ukraine's coal)	Dnipropetrovs'ka, Donets'ka, and Luhans'ka Oblasts'	130,000 [4]
Do.		Lviv-Volynskiy Basin (18 mines that produce about 10% of Ukraine's coal)	Western Ukraine	6,000,000 [4]
Brown		Dnipr (Dneprovskoye) Basin	Central Ukraine	7,000,000
Ferroalloys:				
Ferrochrome		Zaporozhye plant	Zaporiz'ka Oblast'	NA
Ferromanganese		do.	do.	NA
Do.		Nikopol ferroalloys plant	Dnipropetrovs'ka Oblast'	250,000
Ferromanganese, blast furnace		Kostyantynivka metallurgical plant	Kostyantynivka	NA
Do.		OJSC Kramatorsk (KrMZ) metallurgical plant	Donets'ka Oblast'	NA
Ferrosilicon		Nikopol ferroalloys plant	Dnipropetrovs'ka Oblast'	200,000
Do.		Stakhanov plant	Luhans'ka Oblast'	NA
Silicomanganese		Nikopol ferroalloys plant	Dnipropetrovs'ka Oblast'	NA
Do.		Stakhanov plant	Luhans'ka Oblast'	1,200,000
Do.		Zaporozhye plant	Zaporiz'ka Oblast'	160,000
Graphite		Zavalyevskiy graphite complex	Zavalyevskiy deposit	40,000
Iron ore:				
Open pit mining		Inguletskiy (Inhulets), Kamysh-Burunskiy, Kryvyy Rih, Poltavskiy, Severnyy (Pivnichny), Sukhaya Balka, Tsentralnyy, Yuzhniy (Pivdenny) and Zaporizhia mining-beneficiation complexes	Kryvyy Rih Basin	90,000,000 [4]
Underground mining		Eksplutatsionnaya Mine of the Zaporozhye Iron Ore Integrated Works cjsc	do.	3,500,000
Do.		Krivbassruda production association (16 mines)	do.	15,000,000 [4]
Kaolin		Prosyanovskoye mining-beneficiation complex	Dnipropetrovs'ka Oblast'	NA
Lead, secondary		"Ukrtsink" OJSC	Kostyantynivka	70,000
Magnesium		Magnii concern	Kalush	18,000
Do.		Zaporozhye titanium-magnesium plant	Zaporiz'ka Oblast'	10,000
Manganese:				
Ore, marketable		Marganets and Ordzhonikdze mining-beneficiation complexes Tavricheskiy complex (under development)	Nikopol' Basin Bol'shoy Tokmak Basin	6,000,000 [4]
Metal		Zaporozhye plant	Zaporiz'ka Oblast'	40,000
Sinter		Nikopol ferroalloys plant	Dnipropetrovs'ka Oblast'	3,000,000
Mercury		Nikitovskiy mining-metallurgical complex	Donets'ka Oblast'	120
Nickel, Ni content in FeNi		Pobuzhskiy mining-beneficiation complex (3 open pit mines and 1 smelter)	Pobugskoye Basin	7,000 [4]
Petroleum, refinery	thousand 42-gallon barrels	Alliance Oil Co.	Kherson	50,200,000
Do.	do.	Lukoil	Odesa	28,600,000
Do.	do.	TNK-Ukraina	Lysychans'k	63,900,000
Do.	do.	Ukraine Oil Co.	Drohobych	28,600,000
Do.	do.	Ukrtatnafta	Kremenchuk	131,000,000
Do.	do.	do.	Nadvirna	18,400,000
Potash, K_2O equivalent		Khlorvinil production association, Stebnik potash plant	Pricarpathian region, L'vivs'ka Oblast'	300,000

See footnotes at end of table.

TABLE 2—Continued

UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Steel, crude	OJSC Alchevsk Iron and Steel Works	Luhans'ka Oblast'	4,500,000
Do.	Azovstal Iron and Steel Works	Mariupol'	4,000,000
Do.	"Dneprospetstal" JSC	Zaporiz'ka Oblast'	1,400,000
Do.	Dnepropetrovsk Iron and Steel Works	Dnipropetrovs'ka Oblast'	2,000,000
Do.	Dnepropetrovsk Tube Works JSC (pipe plant)	Dnepropetrovsk	1,230,000
Do.	Dneprovsky Iron and Steel Integrated Works	Dniprodzerzhyns'k	3,850,000
Do.	Donetsk Iron and Steel Works	Donets'ka Oblast'	1,300,000
Do.	OJSC Ilyich Iron and Steel Works of Mariupol	Mariupol'	7,300,000
Do.	ISTIL minimill	Donets'k	1,000
Do.	Khartsyzsk Tube and Pipe Works JSC (khTZ)	Donets'ka Oblast'	NA
Do.	Kostantinovsky Steel Works	Kostyantynivka	NA
Do.	Kryvy Rih plant (AcelorMittal)	Dnipropetrovs'ka Oblast'	10,650,000
Do.	Nikopol pipe plant "YutiSt"	do.	NA
Do.	Nizhnedneprovsky pipe-rolling plant (NTZ)	do.	NA
Do.	Yenakiyeveskiy steel mill	Donets'ka Oblast'	1,200,000
Do.	Zaporozhye Steel-Rolling Mill	Zaporiz'ka Oblast'	2,300,000
Sulfur	Sera production association	Rozdol mining complex: Rozdol, Soroks, and Zdhidalchev deposits Yarvorov complex: Nemirov-Yazov deposits in L'vivs'ka and Kyyivs'ka Oblasts'	1,500,000 [4]
Titanium:			600,000 [4]
	Facilities:	Locations:	
Ilemenite concentrate	Irshansk mining-beneficiation complex Verkhnedneprovsk mining-metallurgical complex Volnogorsk state mining-metallurgical complex	Irsha Valley Dnipropetrovs'ka Oblast' do.	
Rutile	Verkhnedneprovsk mining-metallurgical complex	do.	60,000
Do.	Volnogorsk state mining-metallurgical complex	do.	NA
Sponge	Zaporozhye titanium-magnesium plant	Zaporiz'ka Oblast'	20,000
Uranium	Vostochnyy mining and beneficiation complex (Ukratomprom)	Zheltyye Vody	NA
Zinc, secondary	"Ukrtsink" OJSC	Kostyantynivka	25,000
Zirconium:			
Ore, zircon	Verkhnedneprovsk mining-metallurgical complex	Dnipropetrovs'ka Oblast'	100,000
Do.	Volnogorsk state mining-metallurgical complex	do.	NA
Metal and compounds	Kharkiv physical-technical institute	Kharkivs'ka Oblast'	NA
Do.	Pridneprovsk chemical plant	Dnipropetrovs'ka Oblast'	NA

[e] Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

[1] Table includes data and information available through February 28, 2009.

[2] Many location names have changed since the breakup of the Soviet Union. Some enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

[3] United Company RUSAL wass formed by the merger of RUSAL (Russian Aluminum), SUAL (Siberian-Urals Aluminum Co.), and the alumina assets of Glencore International AG, which was completed in March 2007.

[4] Capacity estimates are totals for all enterprises that produce that commodity.

THE MINERAL INDUSTRY OF THE UNITED KINGDOM

By Alberto Alexander Perez

In 2007, the United Kingdom was ranked second after Germany within the European Union (EU) in terms of its gross domestic product (GDP), which was $2,727 billion. The output of the United Kingdom's industrial sector was mostly unchanged compared with that of 2006; however, inventories in the mining and quarrying sector decreased by $210 million, ending 2007 with a total value of $1,506 million.[1] The country continued to be a major regional processor of raw minerals and a manufacturer of producer and consumer durables. The country's heavy industries, which included companies that produced automotive and aviation products, chemicals, and machine tools, relied heavily on imported metal ores and concentrates, as well as on some industrial minerals and mineral fuels. The mineral fuels sector, which included coal, natural gas, and petroleum, formed a significant segment of the United Kingdom's mineral industry. The country also accounted for about 4% of the world's refined lead production, about 3% of refined nickel and crude salt production, about 2% of potash production, and more than 1% of the world's production of aluminum and crude steel (U.S. Central Intelligence Agency, 2007, p. 598; Fenton, 2008, p. 37.17; Kostick, 2008, p. 63.23; Bray, 2009, p. 5.15; Guberman, 2009, p. 42.18; Jasinski, 2009, p. 58.8; Office for National Statistics, 2009, p. 3-15.).

Minerals in the National Economy

Mining and quarrying in the United Kingdom accounted for 11.7% of the total industrial activity in 2007; metal and base metal goods production accounted for 8%; and the production of coke, nuclear fuels, and refined petroleum accounted for 1.3%. The total value of investment in the mining and quarrying industry in 2007, according to the latest available data (2009), amounted to about $10.8 billion. The value of investment in oil refining and in solid and nuclear fuels amounted to about $538 million. Investment in the metals and metal goods sector amounted to $2.35 billion. The volume of production of metals and base metals and, in the energy sector, of the coal, gas, and oil industry, decreased by 1.8% and by 6.1%, respectively, compared with production in 2006. Aggregates, construction materials, and industrial minerals constituted about 9% of the total value of mineral production in 2006 and remained at similar levels in 2007 (Hetherington and others, 2007, p. 1; Office for National Statistics, 2009, p. 49-68).

The United Kingdom's mineral sector not only served domestic economic needs but its mining and processing companies also continued to play an important role in global mineral prospecting, mineral development, and mineral commodity trade. The London Metal Exchange remained the dominant world central market for nonferrous metals.

Government Policies and Programs

The 1971 Minerals Act, as amended, is the statute that governs the development and exploitation of mineral deposits. Minerals, as defined in Section 209 of the Act, include all minerals and materials in or under the land of a kind ordinarily worked for removal by underground or surface workings; it does not, however, include peat cut for purposes other than for sale. Mineral development is specifically addressed in the Town and Country Planning (Minerals) Regulations, 1971, and the Town and Country Planning (Minerals) Act, 1981. Mineral rights to mineral fuels, such as coal, petroleum, and uranium, belong to the state. The Coal Authority is authorized to license open pit and underground mines to the private sector subject to restrictions on their size and the payment of a royalty on the amount of coal produced.

In Great Britain (which includes England, Scotland, and Wales), the rights to most other minerals are privately owned with the exceptions of gold and silver, which are vested in the Royal Family. A different situation regarding mineral rights applies to Northern Ireland where, under the Mineral Development Act (Northern Ireland), 1969, the rights to work minerals and to license others to do so are vested in the state. Although the Government had ratified the Kyoto Protocol, the EU decided to meet Kyoto requirements as a whole, rather than as individual signatories, with each member state given a different emissions target by the EU.

Production

In 2007, the United Kingdom's production of coal and natural gas continued to decline, whereas production of crude petroleum increased slightly. The increase in the value of petroleum production compared with that of 2006 was mostly owing to an increase in its price. Coal production declined to 17.3 million metric tons (Mt) because of a decrease in production from underground mines. The production of natural gas decreased in the United Kingdom by 10% to 72 billion cubic meters from 8 billion cubic meters in 2006. Since 1999, the annual output of coal had dropped by about 47% and that of crude petroleum, by about 38%. Natural gas output had declined by 23% since 2002.

Production of metals had mixed results compared with output levels in 2006. Minor production gains were posted for crude and hot-rolled steel. Minor production increases were noted for primary aluminum, although secondary aluminum production decreased slightly. Production of cement and potash increased slightly (table 1; Office for National Statistics, 2009, p. 49-68).

Structure of the Mineral Industry

Domestic and internationally owned corporations produced minerals and mineral-based commodities. Table 2 is a list of major mineral industry facilities.

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[1] Where necessary, values have been converted from the British pound sterling (£) to U.S. dollars (US$) at the average rate of £0.50=US$1.00 and from the European euro (€) to U.S. dollars (US$) at the average rate of €0.731=US$1.00 for 2007.

Mineral Trade

The United Kingdom was a net importer of crude petroleum, natural gas, nonferrous metals, and steel in 2007. However, it exported metal ores for a total value of $5.8 billion. The value of its exported petroleum and petroleum products was $45.5 billion, and the value of its iron and steel and nonferrous metals exports was $12 billion and $11.6 billion, respectively. Since 2004, the United Kingdom has been a net importer of natural gas; since 2005, of crude petroleum; and after 2006, of refined petroleum products following many years of self-sufficiency (Office for National Statistics, 2009, p. 91-99).

Commodity Review

Metals

Copper and Nickel.—Following the release of data from the Tellus project for Northern Ireland, Lonmin plc took out licenses for the Antrim Plateau and was actively exploring for magmatic sulfide deposits containing nickel and copper. Alba Mineral Resources plc reported having reached a joint-venture and exploration option agreement with Inco Ltd. of Canada in 2006. The agreement gave Inco the right to earn a 60% interest in the Arthrath project in return for a capitalization of $3.14 million for exploration during a 4-year period. Alba reported that extensive disseminated magmatic nickel-copper sulfide mineralization was present on the Arthrath prospect (Alba Mineral Resources plc, 2006; British Geological Survey, 2008, p. 74).

Gold.—The number of licenses for exploration and development of gold mines in the United Kingdom increased to 22 in 2007 from 12 in 2006, with three new licenses granted in Scotland and an additional seven in Northern Ireland. The number of leases dropped from six to four when Caledonia Mining Corp. of Scotland and Stoic Mining of Wales relinquished their leases. The increase in the international price of gold revived the interest in gold in the United Kingdom in 2007. Tournigan Gold Corp. continued with exploration of the Curraghinalt deposit, which is located 15 kilometers northeast of the town of Omagh in Northern Ireland. The deposit could potentially also have economically recoverable copper in associated copper sulfides. Metallum Resources plc was awarded licenses for exploration and development and others were awaiting results from the Tellus project. Metallum Resources was planning to explore for gold mineralization in the Dalradian, in the northwest of Northern Ireland between Cookstown and Omagh, and in the south in the Districts of Armagh and Down (British Geological Survey, 2008, p. 51-53).

In Scotland, Scotgold Resources plc purchased the gold and silver assets of the Cononish deposit, which is located near Tyndrum, in December 2007. The company planned a drilling program to identify the extent of the mineralization; Scotgold, however, had yet to obtain a lease from Mines Royal, which is the official lease granting authority in the United Kingdom.

Industrial Minerals

The United Kingdom remained an important producer of such minerals as barite, calcareous material for cement, clays, and fluorspar.

Barite.—Locally produced barite continued to be a major component in the drilling mud used by petroleum drilling companies that operated in the North Sea, although some barite was being sold as a heavy aggregate in dense concrete to provide for radiation shielding. The major producer of barite in the United Kingdom was M-I Drilling Fluids (UK) Ltd., which operated the underground Foss Mine near Aberfeldy in Perth and Kinross, Scotland. The remainder of the production of barite was confined to the Southern Pennine Orefield where barites are derived as a byproduct of fluorspar mining (British Geological Survey, 2008, p. 25).

Cement.—In 2007, Lafarge Cement UK, Ltd. started design and feasibility studies for a "Medway works" in Snodland, Kent. The planning permission had been granted in 2001, and the company was preparing the site for construction and was adding new infrastructure. Raw materials for cement produced in the United Kingdom included chalk, clays, limestone, and mudstone. Cement-manufacturing companies included Lafarge Cement UK, Ltd., Castle Cement Ltd., CEMEX UK Operations, Ltd., and Buxton Lime Industries Ltd., which had total clinker capacities of 6.0 million metric tons per year (Mt/yr), 3.6 Mt/yr, 2.8 Mt/yr, and 800,000 metric tons per year (t/yr), respectively (British Geological Survey, 2008, p. 29).

Fluorspar.—Glebe Mines Ltd. was the only domestic producer of fluorspar (calcium fluorite), and it supplied the two United Kingdom fluorochemical producers with acid-grade fluorspar. Glebe's operations were based on surface extraction and processing in the Southern Pennine Orefield. Glebe operated the Cavendish Mill near Stoney Middleton, Derbyshire, for the supply of acid-grade fluorspar, together with byproduct barite and lead concentrate. Reserves of fluorite were estimated to be about 1 Mt, which would be sufficient to meet mill requirements for the next 10 years at current production levels (British Geological Survey, 2008, p. 48-49).

Mineral Fuels

Coal.—The increase in the price of coal positively affected the coal industry, prompting the reopening of two mines in the area of South Wales. One of the mines was located in The Vale of Neath and was owned by Unity Power plc; the other was located in Aberpergwm and was owned by EnergyBuild Holdings Ltd. Corus Group hoped to develop a new mine in Margam to supply metallurgical coal to its steelworks in nearby Port Talbot, South Wales. Hatfield Colliery in Yorkshire reopened in 2007 owing to a $200 million investment by Powerfuel Ltd., and the company was seeking permission to develop a site nearby. UK Coal plc made an operating profit in 2007 owing to the high world coal price, which, in turn, enabled the company to develop its sites and expand reserves in deep and opencast mines (Minerals UK, 2006a, b; British Geological Survey, 2008, p. 33-35).

Natural Gas and Petroleum.—In 2007, the price of petroleum reached record highs when the price almost doubled during the year. Early in March 2007, the Department of Trade and Industry put out a call for additional hydrocarbon recovery research and development (R&D) proposals, looking to sponsor joint industry projects to unlock low permeability and heavy petroleum reservoirs and improve recovery in mature water-flooded reservoirs. In June 2007, the Government department that oversees the petroleum and gas industry changed its name from the Department of Trade and Industry to the Department for Business, Enterprise and Regulatory Reform (BERR). Fourteen development wells were spudded onshore in 2007 compared with 12 in 2006. During the previous 10 years, the number of such wells drilled each year had been in the range of 12 to 21. Offshore, a total of 163 development wells were started; this was a 15% reduction compared with the number of wells started in 2006. More than 60% of the wells were drilled in the central North Sea area. The Buzzard oilfield in the outer Moray Firth came onstream in January and became immediately the most prolific oilfield on the United Kingdom continental shelf (UKCS), producing more than twice as much as Elgin, which was the second ranked producing field. The North Sea holds Europe's largest natural gas and petroleum reserves. As of January 2006, the United Kingdom's estimated proven crude oil reserves totaled 4.0 billion barrels, which was the largest within the EU; the reserves were located mostly offshore on the UKCS. Most of the country's production has come from basins east of Scotland in the central North Sea. The northern North Sea, east of the Shetland Islands, also contains considerable reserves, and smaller deposits are located in the North Atlantic Ocean. Besides these offshore assets, the country had the Wytch Farm field, which was the largest onshore oilfield in Europe (U.S. Energy Information Administration, 2006; British Geological Survey, 2008, p. 75-85).

Outlook

The United Kingdom is likely to continue to be a major European and global processor and fabricator of crude mineral products. Onshore exploration activities will probably be directed mainly toward gold and mixed sulfide ores, particularly in Northern Ireland. Offshore natural gas and petroleum exploration and site development will continue to be focused in the North Sea, particularly in the areas west of the Shetland Islands, the central North Sea, and the Southern Gas basin of the North Sea.

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TABLE 1
UNITED KINGDOM: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
METALS						
Aluminum, metal:						
Primary		342,748	359,631	368,477	360,300	364,600 [2]
Secondary		205,400	205,400	205,301	197,900	193,900 [2]
Total		548,148	565,031	573,778	558,200	558,500 [2]
Cadmium, metal, including secondary		22	--	--	--	--
Iron and steel:						
Iron ore and concentrate, manganiferous:						
Gross weight		500	500	354	350 [e]	300
Fe content, 54% Fe		275	275	195	195 [e]	162
Metal:						
Pig iron	thousand metric tons	10,228	10,180	10,236	899	899
Steel:						
Crude	do.	12,900 [e]	13,766	13,210	13,931	14,300 [2]
Hot-rolled	do.	10,396	11,528	10,299	10,500 [e]	11,300 [2]
Lead:						
Mine output, Pb content[e]		700	500	500	500	400 [2]
Metal:						
Smelter, bullion from imported concentrate		9,000	36,000	36,000	35,000	35,000
Refined:						
Primary[3]		196,000	125,938	161,350	163,700	163,700 [2]
Secondary[4]		169,574	120,000	143,000	144,000	144,000 [2]
Total		365,574	245,938	304,350	307,700	307,700 [2]
Nickel, metal, refined[5]		26,788	38,606	37,600	36,800	36,800 [2]
Zinc, metal, smelter		99,600	16,600	--	--	--
INDUSTRIAL MINERALS						
Barite[e, 6]		57,000	61,000	62,000	60,000	60,000
Bromine[e]		25,000	--	--	--	--
Cement, hydraulic	thousand metric tons	11,215	11,405	11,216	11,400	11,890 [2]
Clays:[e]						
Fire clay	do.	528	402	395	228 [r]	200 [2]
Fuller's earth[7]	do.	19	115	--	--	--
Kaolin, china clay[8]	do.	2,097 [2]	1,995 [2]	1,911 [2]	1,900	1,671 [2]
Ball clay and pottery clay[7]	do.	885	965	1,011 [2]	1,000	1,022 [2]
Other, including shale	do.	10,680 [2]	11,164 [2]	10,898 [2]	11,000	11,000
Feldspar, china stone		2,865	2,274	1,835	2,000 [e]	1,000
Fluorspar, all grades[e, 9]		56,000	50,080 [2]	60,980 [2]	60,000	45,000
Gypsum and anhydrite[e]	thousand metric tons	1,700	1,686	1,700	1,700	1,700
Lime, hydrated and quicklime[e]	do.	1,500	1,500	1,500	1,500	1,500
Nitrogen, N content of ammonia	do.	1,044	1,071	1,080	1,100	1,100
Potash, KCL product		1,040,000	912,000	732,000	700,000 [e]	716,000
Salt:[e]						
Rock	thousand metric tons	1,700	2,000	2,000	2,000	2,000
From brine	do.	1,000	1,000	1,000	1,000	1,000
In brine, sold or used as such	do.	3,200	2,800	2,800	2,800	2,800
Sand and gravel, common sand and gravel	do.	91,211	97,333	94,666	95,000 [e]	95,000
Sodium compounds, carbonate, n.e.s.[e, 10]	do.	1,000	1,000	1,000	1,000	1,000

See footnotes at end of table.

TABLE 1—Continued
UNITED KINGDOM: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007[e]
INDUSTRIAL MINERALS—Continued						
Stone:						
Calcite[e]	thousand metric tons	10	10	10	10	10
Chalk	do.	8,066	7,997	7,105	7,000[e]	7,400
Dolomite	do.	12,167	12,226	11,514	11,500[e]	12,101[2]
Igneous rock	do.	51,356	53,037	53,104	53,000[e]	53,000
Limestone	do.	78,935	81,648	77,596	80,000[e]	78,697[2]
Sandstone	do.	18,259	18,844	18,685	18,500[e]	19,000
Slate, including fill	do.	832	901	928	900[e]	870
Total[e]	do.	170,000	175,000	169,000	171,000	171,078[2]
Sulfur, byproduct:						
Talc, soapstone, pyrophyllite		6,494	3,881	6,000	6,000[e]	6,000
Titanium, titanium dioxide[e]	thousand metric tons	200	200	200	200	200
MINERAL FUELS AND RELATED MATERIALS						
Coal, anthracite and bituminous:	thousand metric tons	28,279	25,096	20,498	20,000[e]	17,030[2]
Coke:						
Metallurgical	do.	4,286	4,038	4,105	4,000[e]	4,000
Breeze, all types	do.	315	298	259	250[e]	250
Gas, natural, marketable[11]	billion cubic meters	103	96	88	80	72[2]
Peat[e]	cubic meters	2,008	1,262	1,505	1,500[e]	1,600
Petroleum:						
Crude[12]	thousand 42-gallon barrels	733,763	715,304	660,285	597,140	602,192[2]
Refinery products	thousand metric tons	84,529	89,828	86,003	85,000[e]	78,000

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. -- Zero.

[1] Table includes data available through February 28, 2009.

[2] Reported figure.

[3] Produced entirely from imported bullion and includes the lead content of alloys.

[4] Includes a small quantity of primary lead from domestic concentrate.

[5] Refined nickel.

[6] Includes witherite.

[7] Salable product.

[8] Sales, dry weight.

[9] Proportions of grades not available; probably about two-thirds acid grade.

[10] Not elsewhere specified.

[11] Methane, excluding gas flared or reinjected.

[12] Excludes gases and condensates.

TABLE 2

UNITED KINGDOM: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity
Aluminum:			
Primary	British Alcan Aluminium Ltd.	Lynemouth Smelter, Northumberland, England	169
Do.	do.	Locchaber Smelter, Fort William, Scotland	41
Do.	Anglesey Aluminium Metal Ltd. (Rio Tinto Corp., 51%, and Kaiser Aluminum and Chemical Corp., 49%)	Holyhead, Gwynedd, Wales	144
Secondary	Hydro Aluminium Deeside Ltd. (Hydro Aluminium AS)	Wrexham, Clwyd, Wales	55
Do.	Cohen Alloys Ltd.	Glasgow, Scotland	NA
Do.	Coleshill Aluminium Ltd.	Coleshill, Warwickshire, England	NA
Do.	Dolgarrog Aluminium Ltd.	Dolgarrog, Conwy, Gwynedd, Wales	9
Barite	M-I Drilling Fluids (UK) Ltd.	Foss Mine, near Aberfeldy, Perthshire, Scotland	50
Do.	Glebe Mines Ltd.	Arthurton West, Bow Rake, High Rake, and Watersaw Mines, Southern Pennine Orefield, Derbyshire, England	15
Celestite	Bristol Minerals Co. Ltd.	Yate, Avon, England	30
Cement	Lafarge Cement UK, Ltd. (Lafarge Group)	Aberthaw plant, East Aberthaw, Barry, South Glamorgan, Wales	500
Do.	do.	Barnstone plant, near Langar, Nottinghamshire, England	--[2]
Do.	do.	Cauldon plant, near Leek, Staffordshire, England	1,000
Do.	do.	Cookstown plant, Cookstown District, Northern Ireland	500
Do.	do.	Dunbar plant, Dunbar, East Lothian, Scotland	1,000
Do.	do.	Hope plant, Hope Valley, Derbyshire, England	1,300
Do.	do.	Northfleet plant, Northfleet, Kent, England	1,000
Do.	do.	Westbury plant, Westbury, Wiltshire, England	700
Do.	Castle Cement Ltd. (Heidelberg Cement AG, 100%)	Ketton plant, Rutland, (near Stamford, Lincolnshire), England	1,400
Do.	do.	Padeswood plant, Mold, Flintshire, Wales	1,400
Do.	do.	Ribblesdale plant, Clitheroe, Lancashire, England	1,400
Do.	CEMEX UK Operations, Ltd. (CEMEX, S.A.B. de C.V., 100%)	Rugby plant, Rugby, Warwickshire, England	1,800
Do.	do.	Barrington plant, Barrington, Cambridgeshire, England	300
Do.	do.	South Ferriby plant, North Lincolnshire, England	800
Do.	Buxton Lime Industries Ltd.	Tunstead plant, Buxton, Derbyshire, England	800
Clay:			
Ball clay	WBB Minerals (S.C.R.-Sibelco NV)	Various operations in northern and southern Devon, England	500
Do.	Imerys Group	Operations in Bovey and Wareham Basins, Dorset, England	300
China clay (kaolin)	do.	Mines and plants in Cornwall and Devon, England	3,000
Do.	WBB Minerals (S.C.R.-Sibelco NV)	Mines and plants in Cornwall, England	1,000

See footnotes at end of table.

TABLE 2—Continued

UNITED KINGDOM: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity
Coal:				
Underground mines		UK Coal plc	Operations in England include the Daw Mill Colliery, Warwickshire; the Kellingley Colliery, North Yorkshire; the Maltby Colliery, Rotherham, Yorkshire; the Thoresby Colliery, Nottinghamshire; the Welbeck Colliery, Nottinghamshire	30,000 [1]
Do.		Goitre Tower Colliery Ltd.	Tower Colliery, Hirwaun, Mid Glamorgan, Wales	500
Surface pits		Scottish Coal Company Ltd.	Operations in Scotland include the Broken Cross pit near Douglas, South Lanarkshire; Chalmerston pit, Dalmellington, East Ayrshire; Chapelhill, South Lanarkshire; Glentaggart pit, near Douglas, South Lanarkshire; Newbigging Farm pit, near Howgate, Midlothian; Powharnal pit, near Muirkirk, East Ayrshire, St. Ninians (Greenbank) pit, northeast of Dunfermline, Fife	4,000
Do.		ATH Resources PLC	Operations in Scotland include the Grievehill, the Laigh Glenmuir, and the Skares road pits in Ayrshire; Glenmuckloch pit, Dumfries and Galloway	1,600
Do.		Celtic Energy Ltd.	Margam pit, near Bridgend, Mid Glamorgan, Wales	350
Do.		do.	Nant Helen Extension pit, Abercraf, West Glamorgan, Wales	400
Do.		do.	Selar pit, Glynneath, West Glamorgan, Wales	400
Do.		Energybuild Holdings Ltd.	Nant-y-Mynydd pit, Neath, West Glamorgan, Wales	130
Do.		H.J. Banks Mining (Banks Group)	Dehli pit, Stannington, Northumberland, England	NA
Fluorspar		Glebe Mines Ltd.	Cavendish Mill at Stoney Middleton, mines in Derbyshire, England	60
Gold	kilograms	Galantas Gold Corp.	Omagh Mine, near town of Omagh, Northern Ireland	900 [3]
Gypsum		British Gypsum Ltd.	Several mines and quarries in England, which include the Barrow Mine, Barrow upon Soar, southeast of Loughborough, Leicestershire; the Brightling Mine, Robertsbridge, East Sussex; the Birkshead Mine, Kirby Thore, near Penrith, Cumbria; the Fauld Mine, Tutbury, near Burton on Trent, Staffordshire; the Kilvington Quarry, Staunton in the Vale, Kilvington, Nottinghamshire; the Marbleegis Mine, East Leake, northeast of Loughborough, Leicestershire; the Newbiggin Mine, Newbiggin, near Kirby Thore, Cumbria	3,500
Lead:				
Primary		Britania Refined Metals Ltd. (Xstrata plc)	Northfleet, Kent, England	180
Secondary		Britannia Recycling Ltd. (Xstrata plc)	Wakefield, West Yorkshire, England	20
Do.		H.J. Enthoven Ltd. (Quexco Inc., 100%)	Darley Dale, Derbyshire, England	75
Natural gas	billion cubic meters per year	Numerous domestic and international oil companies	North Sea gasfields	100 [2]

See footnotes at end of table.

TABLE 2—Continued

UNITED KINGDOM: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity
Nickel, refined		INCO Europe Ltd. (CVRD INCO Ltd.)	Clydach Refinery, near Swansea, West Glamorgan, Wales	30
Nitrogen, N content of ammonia		Terra Nitrogen Ltd.	Billingham, Durham, England and Severnside, near Bristol, Avon, England	550
Do.		GrowHow UK Ltd. (Kemira GroHow Oyj)	Ince, Lancashire, England	400
Petroleum:				
Crude	million 42-gallon barrels per day	Numerous domestic and international oil companies, which include Apache North Sea Ltd., BG Group, BHP Billiton Ltd., BP p.l.c., Challenger Minerals Inc., Chevron Ltd., ConocoPhillips Ltd., Dana Petroleum plc, Eni Ltd., Exxon Mobil Corp., Hess Corp., Lundin Britain Ltd., Maersk Oil UK Ltd., Marathon Oil U.K. Ltd., Midmar Energy Onshore Ltd., Nexen Petroleum Inc., Noble Energy (Europe) Ltd., Oilexco Inc., Perenco UK Ltd., Petro-Canada UK Ltd., Premier Oil plc, Royal Dutch Shell plc, Statoil (U.K.) Ltd.,Talisman Ltd., Total S.A., and Tullow Oil (U.K.) Ltd.	North Sea oilfields	2
Refined	million 42-gallon barrels	Exxon Mobil Corp.	Fawley refinery, Southampton, Hampshire, England	120
Do.	do.	Royal Dutch Shell plc	Stanlow manufacturing complex, Ellesmere Port, Cheshire, England	100
Do.	do.	ConocoPhillips Ltd.	Humber refinery, South Killingholme, North Lincolnshire, England	90
Do.	do.	Total S.A,	Lindsey refinery, Killingholme, North Lincolnshire, England	85
Do.	do.	Chevron Ltd.	Pembroke refinery, Pembroke, Dyfed, Wales	82
Do.	do.	Ineos Group	Grangemouth refinery, Grangemouth, Stirling, Scotland	80
Do.	do.	BP p.l.c.	Coryton refinery, Stanford-le-Hope, Essex, England	80
Do.	do.	Petroplus Holdings AG	Teesside refinery, Middlesborough, Cleveland, England	43
Do.	do.	Total S.A., 70%, and Murco Petroleum Ltd., 30%	Milford Haven, Dyfed, Wales	40
Do.	do.	Eastham Refinery Ltd. (Shell UK Ltd., 50%, and AB Nynas Ltd., 50%)	Eastham refinery, Ellesmere Port, Cheshire, England	9
Do.	do.	AB Nynas Ltd.	Dundee refinery, Dundee, Scotland	4
Platinum-group metals		Johnson Matthey plc	Refineries at Enfield (London) and Royston, Hertfordshire, England	NA
Do.		CVRD Inco Ltd.	Acton refinery, London, England	NA
Potash		Cleveland Potash Ltd. (Israel Chemicals Ltd., 100%	Boulby Mine, Yorkshire, England	1,000
Salt:				
Road		do.	do.	600
Rock		British Salt Ltd.	Middlewich, Cheshire, England	800
Do.		Irish Salt Mining and Exploration Co. Ltd.	Kilroot Mine, Carrickfergus District, Northern Ireland	500
Sand and gravel		Hanson plc	Various offshore and onshore locations	NA
Silica sand		WBB Minerals (S.C.R.-Sibelco NV)	Various operations in Cheshire, Humberside, and Norfolk, England	5,000
Do.		Hanson plc	Various locations	NA

See footnotes at end of table.

TABLE 2—Continued
UNITED KINGDOM: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities[1]	Annual capacity
Slate, natural	Alfred McAlpine Slate Ltd. (Welsh Slate Ltd.)	Operations in Wales include the Penrhyn quarry, Bethesda, Conwy; the Pen Yr Orsedd quarry, Nantlle, Gwynedd; quarries at Blaenau Ffestiniog and Cwt y Bugail, Gwynedd	1,000
Do.	Greaves Welsh Slate Company Ltd.	Llechwedd Slate Mines, Blaenau Ffestiniog, Gwynedd, Wales	NA
Soda ash	Brunner Mond Group (Tata Chemicals Ltd.)	Northwich, Cheshire, England	900
Steel	Corus Construction & Industrial (Corus Group plc)	Scunthorpe Works, Scunthorte, Lincolnshire, England	4,500
Do.	Corus Teesside Cast Products (Corus Group plc)	Teesside Works, Redcar, Cleveland, England	3,900
Do.	Corus Strip Products UK (Corus Group plc)	Port Talbot works, Port Talbot, West Glamorgan, Wales	3,750
Do.	Corus Engineering Steels (Corus Group plc)	Rotherham Works, Rotherham, South Yorkshire, England	1,200
Do.	do.	Stocksbridge Works near Sheffield, South Yorkshire, England	NA [4]
Do.	Corus Special Profiles (Corus Group plc)	Skinningrove, Carlin How, near Saltburn-by-the-Sea, Cleveland, England	NA
Do.	Celsa Manufacturing Ltd. (Grupo Celsa, 100%)	Tremorfa Works, Cardiff, South Glamorgan, Wales	850
Stone, crushed	Hanson plc	90 quarries in various locations	70,000
Talc	Alex Sandison and Son Ltd.	Unst, Shetland Islands	15
Tin, ore	Baseresult Holdings Ltd.	South Crofty Mine, Cornwall, England	NA [5]

Do., do. Ditto. NA Not available. -- Zero.

[1] May include historic, postal, or preserved counties instead of current regional governments, such as cities, county boroughs, or unitary authorities.

[2] Grinding plant only. Kilns closed in May 2006.

[3] Under construction.

[4] Remelt facilities.

[5] Mine has been on care-and-maintenance status (but open for tours) since operations were suspended in 1998. Redevelopment of the mine is underway.

THE MINERAL INDUSTRY OF UZBEKISTAN

By Richard M. Levine and Glenn J. Wallace

Although Uzbekistan was a significant regional producer of a number of mineral commodities, including nonferrous metals and natural gas, it was a major world producer of two mineral commodities: gold and uranium. Minerals were extracted from more than 400 mines, open pits, and oil and gas wells. The two leading mineral production enterprises in the country were the Almalyk and the Navoi mining and metallurgical complexes.

Minerals in the National Economy

Mineral exports are a major source of revenue for Uzbekistan's Government. Gold was Uzbekistan's second ranked foreign-exchange-earning commodity and was unofficially estimated to provide about 20% of the country's export earnings. The country also exported other mineral products, which included mineral fertilizers, natural gas, nonferrous metals (copper and zinc), silver, and uranium (U.S. Department of State, 2008).

Production

In 2007, production results were mixed; production increases were recorded for some metals, including steel and zinc, but production was estimated to have decreased for copper. Reported data was unavailable at the time this report was written for the production of industrial minerals, but production is estimated to have remained at the 2006 level of output. Production results for mineral fuels were also mixed; production decreased for oil but increased for coal, natural gas, and uranium. Data on mineral production are in table 1.

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities.

Commodity Review

Metals

Copper.—The Almalyk mining and metallurgical complex, which was located in a large copper porphyry region, comprised the following: two mining enterprises that mined the Kalmakyr and the Sary-Cheku copper porphyry deposits in Toshkent Province and the Uchkulach lead-zinc-barium deposit in Jizzax Province; two beneficiation plants; and two metallurgical plants (Interfax Russia & CIS Metals and Mining Weekly, 2008a). Almalyk produced all the country's copper and zinc output, 90% of its silver output, and 20% of its gold output (Interfax Russia & CIS Metals and Mining Weekly, 2008a). In 2007, Almalyk reduced its refined copper output by about 3.2% to 92,000 metric tons (t).

In more than 50 years of mining, only about 20% of Almalyk's copper reserves (calculated according to the Soviet reserve classification system) had been depleted. The Almalyk complex was processing about 30 million metric tons per year (Mt/yr) of ore, and the metallurgical plant had the potential to increase production significantly. Besides copper, ore from Almalyk contained gold, rhenium, selenium, silver, sulfur, and tellurium. Production of these byproduct metals accounted for 40% of the value of Almalyk's output (Mavlyanov and others, 2007; Interfax Russia & CIS Metals and Mining Weekly, 2008a).

Gold.—The country's main reserves of gold and uranium are located in the Central Kyzylkum region between the Amu Darya and the Syr Darya rivers. The ores were mined and processed by the Navoi mining and metallurgical complex. The Navoi complex had more that 20 gold deposits in western Uzbekistan, of which the largest by far was the Muruntau deposit, which is one of the world's largest gold deposits. Gold from this deposit was mined from an open pit. Navoi's gold production had averaged between 57 and 60 metric tons per year (t/yr) in recent years.

Navoi also had shared production from the Zarafshan-Newmont joint venture, which was formed by Navoi, Newmont Gold Corp. of the United States, and the Uzbekistan State Committee for Geology and Mineral Resources (Goskomgeologia).

The Zarafshan-Newmont joint venture recycled tailings generated from the Muruntau gold lode. The processing plant was officially opened on May 25, 1995. The joint venture initially contracted to process 220 million metric tons (Mt) of ore averaging 1.23 grams per metric ton (g/t) gold and containing 5.1 million troy ounces (158.63 t) of recoverable gold. Zarafshan-Newmont employed about 900 people (Interfax Russia & CIS Metals and Mining Weekly, 2007a).

Previously, in March 2006, the Government of Uzbekistan notified the Zarafshan-Newmont joint venture that tax reforms were in process and, in June 2006, Uzbekistan's courts had ordered Zarafshan-Newmont to pay $48 million in back taxes, froze the joint venture's assets, and seized some of its gold. Then, on August 11, 2006, the Government of Uzbekistan launched a criminal investigation against the joint venture and its employees and blocked the export of any gold. Although Newmont lost control of the day-to-day operations of the joint venture, the company continued to mine and process gold (Radio Free Europe/Radio Liberty, 2006).

In September 2006, 2 months after authorities seized gold and other assets based on two tax claims for payments due between 2002 and 2005, Newmont wrote off the value of its stake in the joint venture. An Uzbekistan court seized $49 million for the disputed tax claims and declared the joint venture bankrupt. In 2007, Newmont reached an agreement whereby it transferred its stake in the Zarafshan-Newmont venture to the Government of Uzbekistan with none of the parties admitting liability regarding any matters in the dispute (Reuters, 2007). According to the agreement, Newmont received $80 million for its 50% stake, which reportedly was less than its estimated book value (Interfax Russia & CIS Metals and Mining Weekly, 2007a).

Lead and Zinc.—In 2007, Almalyk increased zinc metal production by an estimated 60% to 71,820 t (Interfax Russia & CIS Metals and Mining Weekly, 2008a). Almalyk produced zinc metal at its zinc smelter on a tolling basis. Almalyk, however, had also started to develop a lead and zinc mining and beneficiation complex to develop the Uchkulach lead-zinc deposit where Almalyk had a mothballed mine. Almalyk was also planning to develop the Khandiza polymetallic ore deposit. The beneficiation plant at the Uchkulach Mine would be capable of processing 500,000 t/yr of ore and the beneficiation plant at the Khandiza Mine would be capable of processing 650,000 t/yr of ore. Plans called for the complex to begin operations in 2009 (Interfax Russia & CIS Metals and Mining Weekly, 2007b).

Mineral Fuels and Related Materials

Coal.—In 2007, Uzbekistan increased coal production almost 6% to 3.302 Mt. Lignite production increased by 5.5% to about 3.2 Mt, but bituminous coal production fell by about 16% to about an estimated 102,000 t. Open Joint-Stock Company (OJSC) Apartak and OJSC Uzbekcoal mined lignite from the Angren coalfield in Toshkent Province and produced 2.955 Mt and 239,000 t, respectively, in 2007. Joint-Stock Company (JSC) Shargunugol was the country's sole bituminous coal mining company and mined the Baysunskoye and the Shargunskoye coalfields in Surxondaryo Province. Explored reserves at the Angren lignite field were reportedly 1.9 billion metric tons (Gt) and reserves at the Baysunskoye and the Shargunskoy bituminous coalfields were reportedly about 1 Gt (Interfax Russia & CIS Interfax Metals and Mining Weekly, 2008b). Coal consumption in Uzbekistan is about 4 Mt/yr and was projected to increase to 9.4 Mt/yr in 2010, of which 9.29 Mt was projected to be lignite and 110,000 t, bituminous coal (Interfax Russia & CIS Metals and Mining Weekly, 2008b).

Natural Gas and Petroleum.—Oil production from Uzbekistan had declined since 2003 because of the lack of new investment and technical capacity to bring new oilfields online. In 2007, Uzbekistan increased natural gas production by an estimated 12.6%. Uzbekistan has large natural gas reserves but development of these reserves was constrained by the lack of available natural gas transport infrastructure. Uzbekistan was also hampered in developing its oil and natural gas reserves by the lack of sufficient foreign investment, an inadequate export pipeline infrastructure, and perceived political risks. Recent agreements with international companies and countries could help Uzbekistan find alternative export routes that could increase its hydrocarbon exports. Although Uzbekistan consumes most of it natural gas production domestically, it does export significant quantities of natural gas to other countries in the region (U.S. Energy Information Administration, 2009).

Uranium.—The Navoi mining and metallurgical complex was the country's only facility for mining and enriching uranium. Navoi had three enterprises that mined uranium using in situ leaching. The company milled uranium at its No. 1 Hydrometallurgical Plant in the city of Navoi (Interfax, 2007). Navoi was also responsible for exporting uranium. Uzbekistan's State Committee for Geology and Mineral Resources stated that uranium resources are contained mainly in 27 deposits whose total reserves were estimated to be 55,000 t. In 2007, the Navoi mining and metallurgical complex produced 2,320 t of uranium compared with 2,270 t (revised) in 2006 (Interfax, 2007).

Navoi planned to develop seven uranium deposits to increase its uranium production by 50% by 2012 and to renovate its sulfuric acid production facilities. It had been conducted exploration, development, and uranium trade agreements mainly with companies from Japan and the Republic of Korea (WISE Uranium Project, 2009).

Outlook

The U.S. Department of State stated that Uzbekistan had the lowest level of foreign direct investment per capita among the members of the Commonwealth of Independent States. The action taken against Newmont could make it more difficult for Uzbekistan to attract major foreign investment to develop its mineral resources.

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TABLE 1

UZBEKISTAN: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	2003	2004	2005	2006	2007
METALS					
Aluminum, secondary[e]	3,000	3,000	3,000	3,000	3,000
Copper:					
Mine output, Cu content	80,000 [e]	83,000 [r]	103,500 [r]	100,000 [r]	95,000
Metal:					
Blister[e]	75,000	93,770 [2]	103,870 [2]	92,300 [r]	89,655 [2]
Refined	77,000 [r]	103,400 [r]	115,000 [r]	95,000 [r]	92,000
Gold kilograms	84,610 [r]	88,350 [r]	84,210 [r]	84,000 [r, e]	85,000 [e]
Molybdenum, mine output, Mo content[e]	500	500	575	600	600
Rhenium[e] kilograms	NA	NA	NA	850 [r]	900
Silver, mine output[e] do.	80,000	80,000	83,000	83,000	83,000
Steel:					
Crude	472,000 [e]	602,166	607,253	592,450 [r]	740,000 [e]
Rolled	446,521	562,200	576,500 [r]	560,000 [r]	700,000
Zinc, metal, smelter, primary[e]	60,000	60,000	35,030 [2]	45,000 [r]	71,820 [2]
INDUSTRIAL MINERALS					
Cement	4,804,800	5,067,800	5,068,000	5,000,000 [e]	5,000,000 [e]
Clays:					
Bentonite[e]	15,000	15,000	15,000	15,000	15,000
Kaolin	169,900 [r]	202,300 [r]	216,600 [r]	251,000 [r]	250,000 [e]
Feldspar	80,000 [r]	82,000 [r]	84,000 [r]	84,300 [r]	84,000 [e]
Fluorspar	88,000	86,000	85,000	88,000	90,000 [e]
Graphite[e]	60	60	60	60	60
Gypsum[e]	80,000	80,000	80,000	80,000	80,000
Iodine[e] kilograms	2,000	2,000	2,000	2,000	2,000
Nitrogen, N content of ammonia[e]	815,000	875,300 [2]	880,000 [r]	940,000 [r]	1,000,000
Phosphate rock:					
Gross weight	433,400 [r]	482,000 [r]	468,000 [r]	600,000	600,000
P_2O_5 content[e]	101,000 [r]	112,000 [r]	109,000 [r]	140,000	140,000
Sulfur:					
Byproduct:[e]					
Metallurgy	170,000	170,000	170,000	170,000	170,000
Natural gas and petroleum	350,000	350,000	350,000	350,000	350,000
Total	520,000	520,000	520,000	520,000	520,000
Sulfuric acid	802,400	834,300	740,500	600,000	600,000 [e]
MINERAL FUELS AND RELATED MATERIALS					
Coal	1,909,000	2,700,000	3,000,000	3,121,000	3,302,000
Natural gas million cubic meters	57,481	59,864	59,686	58,000	65,300
Petroleum and gas condensate	7,134,000	6,580,000	5,490,000	5,410,000	4,928,000
Petroleum refinery products	5,807,000	7,749,000	4,600,000	4,800,000 [r]	4,800,000 [e]
Uranium:					
U content	1,598	2,016	2,300	2,270 [r]	2,320
U_3O_8 content	1,885	2,377	2,712	2,677 [r]	2,736

[e] Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r] Revised. do. Ditto. NA Not available.

[1] Table includes data available through February 28, 2009.

[2] Reported figure.

TABLE 2

UZBEKISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Bismuth	Ustarassay deposit (depleted)	Chotqol and Kuraminskiy Khrebet regions	NA
Cesium, lithium, rubidium	Shava-Say deposit	NA	NA
Clays:			
Bentonite	Arab-Dasht and Khaudag deposits	NA	NA
Kaolin	Angren deposit	Angren region	8,000,000
Coal:			
Lignite	OJSC Uzbekcoal and OJSC Apartak	Angren deposit, Toshkent Province	6,000,000
Bituminous	JSC Shargunugol	Baysunskoye and Shargunskoye deposits, Surxondaryo Province	1,000,000 [3]
Copper:			
Mine output, Cu content	Almalyk mining and metallurgical complex	Dalneye, Kalmakyr, and Sary-Cheku deposits	100,000 [3]
Metal	Almalyk refinery	Olmaliq	130,000
Diamond	Karashok and Kok-Say deposits	Navoiy Province	NA
Feldspar	Karichasayskoye and other deposits	Deposits in Samarqand and Toshkent Provinces; Qoraqalpog'iston Province	120,000 [3]
Fertilizers	Ammophos production association	Olmaliq	NA
Do.	Azot production association	Farg'ona	NA
Do.	Elektrokhimprom production association	Chirchiq	NA
Do.	Kokand superphosphate plant	Qo'qon	NA
Do.	Naviazot production association	Navoiy Province	NA
Do.	Samarqand chemicals plant	Samarqand	NA
Fluorspar	Agata-Chibargata, Aurakhmat, Kengutan, Kyzylbaur, Naugarzan, and Nugisken deposits	East of Toshkent Province	150,000
Do.	Syrpatash deposit	Namangan Province	NA
Gold kilograms	Adzhi-Bugutty, Amantaytau, Balpantau, Bulutkan, Donguz-Tau, Muruntau, and Taurbay deposits	Central Kyzylkum region	85,000 [3]
Do.	Navoi Integrated Mining and Metals complex (Uzbekistan State Committee for Geology and Mineral Resources)	Muruntau deposit	65
Do.	Kochbulak and Kyzyl-Al'ma-Say deposits	Toshkent Province	NA
Do.	Almalyk mining and metallurgical complex	Dalneye, Kalmakyr, and Sary-Cheku deposits	NA
Graphite	Tadzhi-Kazgan deposit	Navoiy Province	NA
Iron ore	Syurenata deposit	Toshkent Province	NA
Lead, mine output, Pb content	Almalyk mining and metallurgical complex; Altyn-Topkan and Uchkulach deposits	Uchkulach deposit in Toshkent Province [Altyn-Topkan deposit is located in the Kurama mountain range in Tajikistan (in 1999, Altyn-Topkan was transferred to the control of Tajikistan)]	40,000 [3]
Manganese	Dautashskoye deposit	Qashqadaryo Province	40,000
Molybdenum:			
Mine output, Mo content	Almalyk mining and metallurgical complex; Kalmakyr and Sary-Cheku deposits	Toshkent Province	900 [3]
Metal	Uzbek refinery and hard metals plant	Chirchiq	NA
Natural gas liquids million cubic meters	Mubarek gas processing plant	Muborak	28,000
Do.	Shurtan gas-chemical complex	Shurtan-Say deposit, Qashqadaryo Province	137,000
Natural gas million cubic meters	Gazli, Kandym, Khauzak, Kokdumalak, Pamuk, and Shurtan-Say deposits (major)	Amu-Dar'ya Basin; Mubarek area	70,000 [3]
Do.	Itera/Lukoil (Russia), Uzbekneftegaz JSC	Kan-Dam field	NA
Natural gas condensate	Trinity Energy (United Kingdom)	Ustyurt Plato region	NA

See footnotes at end of table.

TABLE 2—Continued

UZBEKISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2007[1, 2]

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity[e]
Petroleum:			
Crude	Kokdumalak and Mingbulak deposits (major)	NA	9,000,000 [3]
Refinery products	Fergana oil refinery	Farg'ona Province	8,800,000
Do.	Bukhara oil refinery	Bukhoro	2,500,000
Phosphate	Kyzylkum complex	Dzheroy-Sardarin Moroccan type; Karaktay, Severnyy, and Dzhetymtau deposits	NA
Polyethylene	Shurtan gas-chemical complex	Shurtan-Say deposit, Qashqadaryo Province	125,000
Potash	Tyubegatan deposit	Southern Uzbekistan	NA
Rhenium	Almalyk mining and metallurgical complex	Toshkent Province	NA
Selenium	do.	do.	NA
Silver	do.	do.	NA
Do.	Kosmanachi, Okzhetpes, and Vysokovoltnoye deposits	Namangan Province	NA
Steel, crude	Bekabad steel mill	Bekabad	1,100,000
Sulfur	Almalyk mining and metallurgical complex	Dalneye, Kalmakyr, and Sary-Cheku deposits	NA
Do.	Mubarek gas processing plant complex	Muborak	2,000,000
Tellurium	Almalyk mining and metallurgical complex	Toshkent Province	NA
Tungsten:	Deposits:	Locations:	1,200 [3]
Mine output, W content	Koytash deposit	Northeastern Uzbekistan	
	Ingichka and Lyangar deposits	Zirabulak Mountains	
	Ugat deposit	Northern Uzbekistan	
Mine output, WO_3 content (0.49%)	Sautbay wolframite deposit	Kyzylkum region	NA
Metal	Uzbek refractory and hard metals plant	Chirchiq	NA
Uranium, U content	Navoi mining and metallurgical complex	Central Kyzylkum region	3,000
Vermiculite cubic meters	Tebin-Bulak deposit	NA	25,000
Zinc:			
Mine output, Zn content	Almalyk mining and metallurgical complex	Khandiza and Uchkulach deposits	NA
Metal	do.	do.	80,000

[e] Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

[1] Table includes data and information available through March 31, 2009.

[2] Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

[3] Capacity estimates are totals for all enterprises that produce that commodity.

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